DOCUMENT RESUME

ED 372 272	CE 066 900
AUTHOR	Nitschke, Christoph; Funderich, Kirk
TITLE	Occupational Structures and Profiles in the Federal Republic of Germany in the Field of Environmental Protection in the Public Service Sector with Reference to Air Pollution Control. CEDEFOP Panorama. National Report.
INSTITUTION	European Centre for the Development of Vocational Training, Berlin (Germany).
PUB DATE	Dec 91
NOTE	194p.
PUB TYPE	Reports - Research/Technical (143) -- Tests/Evaluation Instruments (160)
EDRS PRICE	MF01/PC08 Plus Postage.
DESCRIPTORS	*Air Pollution; Case Studies; Comparative Analysis; *Educational Needs; *Employment Qualifications; Foreign Countries; Job Analysis; National Surveys; Occupational Information; Postsecondary Education; Private Sector; *Public Service Occupations; Questionnaires; Secondary Education; *Vocational Education
IDENTIFIERS	*Environmental Protection; *Germany

ABSTRACT

A study examined the knowledge and job skills required of persons employed in air pollution control-related occupations in Germany's public service sector. In all, 18 persons from 11 offices in 10 public institutions were interviewed. In seven cases, two people from the same institution (one performing managerial duties and the other directly involved in controlling air pollution) were interviewed. The interview findings were used to develop a total of 18 profiles of occupations in the following aspects of the field of air pollution control: policymaking, research, inspection and control, and provision of information to the public. The work performed by persons employed in air pollution control-related occupations in the public service and private sectors was compared. Occupational profiles in the public service sector were found to be more rigid than those in the industrial sector and tended to call for higher qualifications. Only 4 of 51 statements made by the interviewees regarding future occupational profiles indicated that existing qualifications would also be sufficient in the future. Appended are the interview instrument, chart of institutions/persons interviewed, classification of environmental occupational profiles, distributions of air pollution control-related tasks and competencies, and 18 occupational profiles. Contains 30 references.) (MN)

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Occupational structures and profiles in the Federal Republic of Germany in the field of environmental protection in the public service sector with reference to air pollution control

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panorama

Occupational structures and profiles in the Federal Republic of Germany in the field of environmental protection in the public service sector with reference to air pollution control

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1st edition, Berlin 1994

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The Centre was established by Regulation (EEC) No 337/75 of the Council of the European Communities.

National report

Cataloguing data can be found at the end of this publication.

Berlin: CEDEFOP - European Centre for the Development
of Vocational Training, 1994

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Foreword

Since the Single European Act creating the legal basis to establish a Single European Market came into effect on 1 July 1987, environmental protection has come under the decision-making sovereignty of the EC. A wealth of EC directives has been passed on environmental protection since then, which Member States are obliged to adopt in their national legislation. Consequently, environmental policy in the EC is constantly taking in more and more spheres and gaining more and more importance.

The public sector in the Member States in particular is concerned with the implementation of these normative regulations and the additional legal rules applicable in the individual States. The most important task in environmental protection falls to them since they not only have to perform their own work but are also responsible for seeing that the private sector complies with all the statutory regulations. At the same time they are called on to influence and support all those who are or should be taking environmental protection issues into account.

As a result, more and more people are being employed in the public sector in the Member States to deal with environmental protection matters and the spectrum of qualifications required is becoming more and more demanding and differentiated.

This is also why CEDEFOP did not manage to fulfil its original intention within the framework of this project and was unable to cover the entire field of environmental protection in the public sector. Instead, working together with the research team from four Member States (D, FR, IT, UK), we restricted ourselves exclusively to air pollution control. The volume of the national studies on this aspect alone shows how many additional studies still need to be conducted in order to examine the occupational profiles in the field of environmental protection in the public sector.

In the work CEDEFOP has conducted so far, a number of Member States and most of the industrial and agricultural sectors have not even been dealt with[*].

For the above reasons we would hope that other organizations might be prompted by these studies and the subsequent synthesis report to conduct further national and transnational analyses of qualifications on their own. This is very important if European cooperation and networking of environmental protection projects are to be stepped up and extended.

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[*] See "Occupational and qualification structures in the field of environmental protection in the metal and chemical industries", D, IT, UK and synthesis report, CEDEFOP, 1991.

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1. Introduction and methodological background

Environmental policy has become more and more important over the last 15 years. Controversial but nevertheless legally binding limits have emerged from grey danger zones; programmes have grown out of objectives and declarations, environmental protection departments have grown into environmental ministries and the countless number of horror reports are being overshadowed by more and more success stories.

Yet environmental policy is under constant reproach for its relative ineffectiveness. Various reasons are cited for this. On the one hand, there is talk of environmental protection being reduced to "mopping up the mess" rather than attacking the problems at their roots. Many failures are quite rightly attributed to the "medial splintering" of environmental policy, meaning soil conservation, air pollution control, water protection, etc. are treated as entirely unrelated entities. Finally, when environmental policy is "farmed out" and comes under the jurisdiction of special authorities, it is often regarded as an additive repair shop to redress the damage done to the environment by the other political departments.

Regardless of what one might think about the institutional organization of environmental policy, in this debate it is easy to forget that the success of governmental action in this area greatly depends on the people in the public sector employed to implement the policy. At the same time the special economic and legal status of this group in the workforce establishes its particular relationship to environmental protection. The primary issue in this discussion is not whether they themselves might pollute the environment in one way or another, but how well they are able to influence the behaviour of others when it comes to environmental protection. This report presents the findings of our investigation into "environmental occupational profiles" in the public sector in Germany. It deals with the ways influence can be exerted, and the conditions and prerequisites for exerting it, taking air pollution control as an example.

The study is part of an international comparative survey which was conducted simultaneously in three other EC countries: France, Italy and the United Kingdom. This project was the continuation of another which was commenced a year earlier. The first stage examined environmental occupational profiles in the metal and chemical industries in the Federal Republic of Germany, Italy, the Netherlands and the United Kingdom. The national reports for this initial part as well as the comparative and summarizing synthesis report, which was written by the principal author of this study, have meanwhile been published.

The research reports on the public sector are not simply the continuation of a topic now being examined as another partial area. Since the competent employees in the public service exert what is primarily an indirect influence on environmental protection and are often the "opponents" of those causing pollution, the reports also present a complementary picture to the studies on industry.

The commissioning body for all these studies was and is the European Centre for the Development of Vocational Training in Europe (CEDEFOP) based in Berlin. CEDEFOP was motivated to examine this subject less by an urge to evaluate environmental policy than from an interest in the issue from the employment and vocational training angle. The latter has to react to what is still a relatively new social sphere of activities and one which is highly controversial into the bargain.

A concrete starting point for the studies on environmental occupational profiles is provided by a major research project undertaken by CEDEFOP on the development and comparability of training courses and occupations in various economic sectors in the Member States of the EC. In connection with this research, major importance has been attached to the concept of "occupational profiles" (using "core tasks" and "required competences" as central elements).

The present study has pilot character in two senses. Firstly, it is exploring new territory. To the best of our knowledge, there is only one similar (as yet unpublished) report on the Federal Republic of Germany which was commissioned by the Federal Environmental Agency. Apart from this, generally speaking only very few projects have been carried out on the connection between environmental protection and employment. Secondly, the pilot or exploratory nature of the study finds expression in the modest volume of work which was compiled in a mere two months. Only an initial impression should and could be gained on the basis of the exemplary case studies.

The members of the international research team agreed to limit the subject-matter of the study as one way of increasing the meaningfulness of our observations. We opted for air pollution control as one example of environmental policy. In view of the criticism being levelled at environmental policies which fail to consider the interrelation of all environmental aspects, we feel this focus does not reflect the trend of the times; on the other hand, this topic seemed to be most suitable from the aspect of international comparability of case studies.

The above-mentioned restriction is only one of many agreements made to make the findings of this study more open to comparability than those of the first partial project by means of methodological homogeneity and a coordinated procedure.

Against the background of preliminary talks, it seemed sensible to distinguish between different types of indirect intervention by the public sector. Linked to this was the consideration that the various forms of intervention would have an effect on the type of jobs required. Correspondingly, the following four key governmental functions were identified:

1. Policy-making
2. Research
3. Inspection and control
4. Provision of information to the public.

In the case of the Federal Republic of Germany, the work of so-called "public companies" was foreseen as a fifth key function, since their work seemed relevant to the problem in question. The four key functions were differentiated further as well. A distinction was made between the locations of competence (1., 3., 4.) and the type of research being carried out (2.) (see Point 2.3 of this report in relation to this).

The two levels of this differentiation in the report worked in practical terms as selection criteria; they influenced our choice with regard to the types of public institutions to be selected for the case studies. The quantitative stipulation of ten cases likewise had a bearing on the selection. Since enquiries had to be conducted for the case studies, two interviews were to be made per case study with people working in environmental protection. One of these interviews was to be with a person with managerial duties, i.e. a more complex sphere of duties (called main interviewee in the study), the other with a person directly involved in carrying out the work.

On the whole a common checklist was used in the interviews. The survey was structured in this way to allow data to be collected on the duties and position of the institution where the interviewee was employed, on the interviewee's own occupational profile, on the work of key colleagues and on future requirements (see the checklist in Annex 1 for more detailed information on this). The occupational profiles of the interviewees are also called the directly surveyed occupational profiles hereafter, while the others are described as the indirectly surveyed profiles.

The survey in the Federal Republic of Germany was conducted between June and July 1991. Because some interviews were cancelled and because some of the profiles were extremely similar in one instance (Code No. 4A), the planned random testing structure was not fully implemented. Altogether we conducted 18 interviews in eleven offices at ten institutions (in seven instances, two interviews per institution; in one case the first and second person from different authorities of the same type; in two instances only one person). One institution was in the random sample twice due to the two different functions it had (see Annex 2 with reference to this).

In view of the small number of case studies, care should of course be taken when evaluating and generalizing these results. The random sample is by no means representative. The decision to include persons with managerial tasks throughout means that this group is over-represented in the statistics in any case.

Unlike the previous study on the metal and chemical industries in the Federal Republic, more emphasis was placed in this survey on presenting individual case studies for the purpose of comparability in a later synthesis report. Consequently, this part of the report takes up a lot of space although only limited conclusions can be drawn from it. The price we paid for focusing on this aspect is that inter-case analysis was forced more into the background.

On the basis of the tasks and priorities described above, the study was structured as follows: First there is an introduction which is followed by a description of environmental and air pollution control policies including their institutional infrastructure in the Federal Republic of Germany. This second chapter is essential for classifying the selected institutions and the occupational functions in an institutional infrastructure. The third chapter is the core of the work. It covers the empirically surveyed individual case studies and provides an overall view. Following it, there is a chapter outlining "what's on offer" in the field of environmental occupational profiles, in other words on relevant training offers and training courses. In the final comments, the occupational profiles in the public sector are compared briefly with those in industry. Their development prospects are examined. A few recommendations on policy can be derived from this section.

2. Environmental and air pollution control policies in the Federal Republic of Germany - a summary

2.1 Features and cornerstones of environmental policy

The foundations of environmental policy in the Federal Republic of Germany were laid down in an environmental programme of the Federal Government in the early 1970s. Environmental policy can be described according to its objectives, principles and instruments. We shall not deal in any detail here with the aims of this programme. The objectives as they were formulated at the time (such as "protecting the air, water and soil, flora and fauna from the negative effects of human intervention"), gave little cause for controversy not least because of their vague wording and non-committal tone. The debate on the principles underlying environmental policy is by far more interesting. Apart from the "common burden" principle we have the "polluter-must-pay", the "prevention" and the "cooperation" principles. These will be explained in brief in the following section (see e.g. Gernert 1990, page 25 f.; Voss 1987, p. 125 f.).

2.1.1 Principles

The common burden principle, intended as the exception rather than the rule, plays a major role in practice in environmental policy. According to this principle, the general public bears the dual burden of direct environmental pollution as well as the expense of its (subsequent) reduction. While the other principles show more foresight, they are often more difficult to implement in practice. The "polluter-must-pay" principle requires that anybody who causes damage to the environment shall be liable for the resulting costs. Goods and production processes which cause serious damage to the environment become more expensive when this principle is enforced so there is incentive to prevent and substitute.

The prevention principle, the precautionary nature of which is reflected in its name, is even more geared to the future. A wide range of knowledge about interrelated ecological causes and effects is needed, however, to implement this principle. It requires nature and the environment to be so anchored in the relevant decision-making processes of society that no damage occurs in the first place. The realization of this principle assumes that problems are identified and solved in ways that are adapted to keep pace with the rapid progress of knowledge and technology. It is only in this way that the economic "agents" can be prevailed upon to act on the basis of state-of-the-art information recognized at the time as causing the least damage to the environment.

The main aim of the cooperation principle is to ensure that any costs incurred for environmental protection are borne jointly by various social bodies. This principle manifests itself for example in governmental appeals to industry to engage in voluntary measures. Admittedly, agreement in these matters is often only reached once the state has given its words emphasis by threatening to impose taxes or take statutory regulatory action.

2.1.2 Instruments

The term "environmental policy instruments" is used to indicate all governmental measures which serve the purpose of fulfilling environmental protection objectives. Normally they can be subdivided into regulatory instruments, economic incentives and agreements while the latter can be considered to be latently regulatory on the whole for the reasons mentioned above. Regulatory instruments include formal legislation, ordinances, administrative regulations and requirements. They name e.g. materials requiring special treatment, lay down emission and pollution limits, describe procedures for authorizing installations and prohibiting products. The principles underlying environmental legislation are the polluter-must-pay principle and the prevention principle. The Federal Emission Protection Law of 1974 and the Petrol Lead Law of 1971 may be cited as important examples of legislation related to air pollution control.

In contrast to these, economic incentives serve the purpose of using market economy mechanisms to promote environmental protection. The aim here is to bill those who cause damage to the environment with the actual costs of "consuming nature" which are not (sufficiently) taken into account in the normal market price of a product. Since this consumption can hardly be calculated in money terms, considerations are moving in the direction of finding a price which will cover the costs of choosing a more environmentally friendly alternative or cover the costs of environmental protection. The difference between this price and the market price is normally to be offset by introducing corresponding levies or taxes. In practice, such an approach seems to have been put into practice only in the form of the so-called "sewage levy". However, considerable changes are in the offing here as a result of the highly topical and controversial debates on "eco-taxes" (e.g. with a view to traffic, increasing the motor vehicles tax, or to energy consumption, the CO_2 tax).

(The debate on buying and transferring "the right to pollute" which is underway might be mentioned in passing at this point.)

The picture of current practice changes when environmental protection subsidies in the form of public financial assistance can be understood as economic incentives. Appropriate tax concessions, e.g. higher rates of depreciation on investments or direct investment aids such as low-interest loans and subsidies are not uncommon.

One whole area of environmental policy instruments has not been mentioned at all so far, measures aimed at informing and guiding the public, at developing environmental awareness and at conducting research projects on environmental protection. Ecologically oriented consumer guidance, the UNESCO liaison office for environmental education at the Federal Environmental Agency and the communal environmental counselling services may be cited as examples. Conflicting opinions are aired as to whether such measures are to be understood as independent types of instruments or whether they come into the category of regulatory instruments.

Environmental statutory regulations are currently the most important instrument of environmental policy in Germany, particulary since even economic instruments require legal protection. In view of this, a few general comments need to be made. Not only are all three state powers involved in the regulation of environmental protection (no attention will be paid to the judiciary here), but also various levels within the organizational structure (federal, Land (state), district and commune). The respective forms of regulation cited above as examples have different degrees of scope and validity and different requirements in connection with the procedures with which the regulations can be adapted to new conditions. Federal legislation is to be placed at the highest level if one leaves the Federal Land of Bavaria aside where environmental protection is even anchored in the constitution. Formal legislation often authorizes the enactment of statutory regulations which serve to make the legislation more concrete. This applies for example to the Federal Emission Protection Law as well.

On the legislative side, the lion's share of responsibility for environmental law lies with the Federal Government. This is laid down in the Constitution within the framework of the so-called concurrent legislation which grants the Laender (states) legislative power only in the event that, for as long as and to the extent that the Federal Government does not make use of its right. According to Article 74 of the Constitution, air pollution control is included in this. Apart from the Federal Emission Protection Law, the Technical Instructions for Controlling Air Pollution and the Large-scale Heating Installations Regulation belong to the most important German environmental laws with the latter being likewise particularly relevant for controlling air pollution. The regulations decreed by the Federal Government do not necessarily mean conclusive regulations for an environmental medium which might be subject to concurrent legislation. For example, § 49 of the Federal Emission Protection Law authorizes the Laender governments to decree certain statutory ordinances. Examples relevant for air pollution control are the Bavarian Emission Protection Law of 1974 and the ordinance specifying polluted areas in Berlin of 1976. Legislative power can be exercised in some Federal Laender below Laender level as well via municipal statute law. For example Articles 10 and 14 of the Bavarian Emission Protection Law provide communities with the opportunity of decreeing regulations related to emission protection which is of relevance in particular in health resorts in Bavaria. Seen overall, since the first German environmental programme was adopted, a great number of environmental laws have been passed which, however, do not reflect a harmonized approach to deal systematically with the complex regulatory demands of the environment. The regulatory network might well appear relatively tight-knit in an international comparison; it still does not guarantee the corresponding implementation, however, which the widespread complaints levelled at the so-called "deficit in execution" illustrate only too plainly.

Although a Federal Environmental Agency, which meanwhile has 800 on its payroll, exists under the control of the Federal Ministry of the Environment, Nature Conservation and Nuclear Safety, the executive power for matters concerning statutory regulation is concentrated mainly in the individual Federal Laender (e.g. authorization procedures, inspection and control). On the basis of regulations or formal legislation, administrations fill the space left open by general administrative regulations. When it comes to environmental policy programmes, authorities further down the line, aside from the Federal Government, are becoming increasingly active. More than 50 promotion programmes underway in the "old" Federal Laender are evidence of this (see Gies et al, 1991). These programmes usually involve air pollution control. (See Aufwendungen für Forschung und Entwicklung auf dem Gebiet der Luftreinhaltung (Spending on research and development in the area of air pollution control), UBA 1989, p. 697 as well.)

2.2 Institutional infrastructure of governmental air pollution control policy

The structure of governmental air pollution control policy in Germany is extremely complex. Information on the various powers and tiers within the framework of governmental environmental policy are an indication of this. The wide variety of relevant legislation completes the picture. This diversity is in turn partly related to the matters requiring regulation. Air consists of 78% nitrogen (N), 20% oxygen

(O) and other residual compounds including among other things 0.03% carbon dioxide (CO_2). All other gases and particulates or rather, their excessive occurrence pollute the air (see BMU, 1990, p. 14). These pollutants can be divided into three large groups:

- Inorganic gaseous pollutants, especially sulphur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO);
- Organic volatile compounds, e.g. aldehydes (such as formaldehyde), aliphatic hydrocarbons (such as benzine), ketones (such as acetone);
- Particulates and mixtures of particulates, e.g. soot, fly ash, culm, cement dust.

Many environmental policy instruments are directed at specific pollutants. For example, there is a "regulation to prohibit certain halogen chlorofluorocarbons (CFC-halon prohibition regulation)" (see UBA, 1989, p. 106 f.); the federal German catalytic converter regulation is directed against carbon monoxide, the regulation on large-scale heating installations against several contaminants (sulphur oxides, carbon monoxide and nitrogen oxides) and the small-scale heating installation regulation is directed against sulphur dioxide and soot.

Although carbon dioxide (CO_2) is a natural phenomena in the air, environmental discussions have focused on this gas in recent years for causing the "greenhouse effect". CO_2 occurs inevitably wherever there is fossil fuel combustion. This applies equally to power station emissions as well as to carbon monoxide from vehicle exhausts. In view of the spiralling number of private vehicles on the roads, (global) reduction of carbon dioxide, together with protection of the ozone layer, is often classified as a priority problem of the future. Although other compounds are far more toxic in their effect on the environment, CO_2 can be considered a major problem since its reduction would also mean the reduction of other pollutant factors at the same time (e.g. NO_x, CO, SO_2).

High-level political reaction to the CO_2 problem can be seen in the Federal Republic in the Federal Diet's Commission of Inquiry on "protecting the earth's atmosphere" and in the establishment of an "Inter-ministerial Working Group on CO_2 Reduction". The recommendations of these committees on environmental policy instruments illustrate how many different political spheres are involved in principle in the "production" of air pollution outside actual "environmental policy", and are called upon to prevent it.

The most important environmental policy control factor in the field of air pollution control is undoubtedly the Federal Emission Protection Law, mentioned several times above. With its ordinances putting the statutes into more concrete terms (e.g. the regulation on large-scale heating installations) and its administrative regulations (e.g. Technical Instructions for Controlling Air Pollution), which likewise have a legal nature, it covers the majority of the above-mentioned air contaminants. Its subject matter is not only classifiable at the level of individual pollutants; its frequently used systematic approach allows pollutants to be located according to categories of protection against pollution related to installations, product, area and behaviour (see Engelhardt, 1985, p. 69, BJU, 1989, Volume 2, No. 8.3., p. 24). When it comes to the jurisdiction of authorities, the Federal Emission Protection Law makes an important differentiation between authorities which authorize and those that monitor; these distinctions vary greatly depending on the Federal Land and thus form a new dimension in the complexity of the institutional structure for controlling air pollution.

Protection against the effects of various forms of pollution related to installations is in the foreground of the work of administrations. On the basis of a regulated definition of installations, a considerable number of paragraphs formulate the conditions that operators of installations must fulfil in order to obtain an authorization. A current list of all the installations which require authorization can be found in the 4th Federal Emission Protection Regulation. This distinction between installations which require an authorization and those which do not is a very important aspect of the administrative process.

In the city-state of Berlin the responsibility for issuing authorizations and monitoring installations which require an authorization lies with the Senat Department for Urban Development and Environmental Protection (§ 52 of the Federal Emission Protection Law); exceptions to this are heating installations, boilers and complete power plants which are monitored by the regional office for work protection and technical safety. The district authorities are able to check on installations which do not require an authorization under the Federal Emission Protection Law.

In contrast to Berlin, in the territorial state of Schleswig-Holstein, the Ministry of Nature, the Environment and Land Development has transferred the competence for issuing authorizations and monitoring them to the factory inspectorates. The responsibility for monitoring individual smaller installations (those not requiring an authorization in accordance with §§ 22 f. Federal Emission Protection Law) is in the hands of chief administrative officers of districts, mayors in towns not administered as districts in their own right, and mayors in municipalities not administered by authorities or heads of departments.

Protection against the effects of various forms of pollution related to installations is complemented by statutes related to products. The relevant regulations are aimed at manufacturers so that they produce and market in as environmentally friendly a way as possible (e.g. §§ 32, 34, 35 Federal Emission Protection Law, 3rd Federal Emission Protection Regulation on the sulphur content of light heating oil and diesel fuel and the 10th Federal Emission Protection Regulation on limiting PCB). Even the independent Petrol Lead Law comes under this variant of pollution control.

Pollution control related to areas takes in a wide spectrum of measures. It covers e.g. planning in accordance with the Urban and Regional Planning Law. Another focal area is the identification of polluted areas (§ 44 Federal Emission Protection Law), especially areas requiring protection (§ 49 (1) Federal Emission Protection Law) and smog areas (§ 49 (2) Federal Emission Protection Law). This can be undertaken by the regional authorities. In such cases, the Laender are allowed to create statutory regulations which control the behaviour of operators of polluting installations in the event of smog.

The competences for this area of pollution control lie with the relevant planning departments of the Laender ministries. It is noteworthy that the municipalities show more interest today than in the past in integrating air pollution control into their planning practice as well (see Fiebig et al, 1990, p. 85 f.). This is evident in local authorities' environmental protection reports and programmes, in communal urban development planning which attempts to control air pollution (e.g. Essen), in town planning skeleton plans focusing on air pollution control (e.g. Alt-Hürth) and in energy and traffic concepts (e.g. Freiburg).

We do not wish to look in closer detail at pollution control related to behaviour since this basically regulates behaviour associated with noise pollution. To the extent that individual Laender have issued regulations concerning the keeping of animals and emissions connected to this, this area of regulation comes into the category of pollution control related to behaviour.

A further distinctive feature of governmental air pollution control policy is the tasks it fulfils. This criteria was touched on above and is of course also anchored in a central place in this research (see Chapter 1). Environmental policy legislation and administration can be directed at policy-making or at inspection and control aspects alone. Research and public provision of information on air pollution as governmental services are other important tasks. At federal level this is mainly carried out by the Federal Environmental Agency although its role in research lies mainly in its policy for awarding contracts. Among the few public bodies engaged in relevant research themselves are the Federal Office for Civil Protection (clean air measurements, measuring aerosol levels), the Federal Office for Materials Research and Testing (e.g. measuring pollutants in motor vehicle exhausts), the Federal Research Agency for the Protection of Nature and Landscape Ecology (e.g. the effect of industrial pollutants on vegetation) and the Regional Office for Protection against Pollutants in North Rhine-Westphalia (e.g. development of series of measurements). However, in the Federal Republic of Germany there is a large number of research institutes which might be described as quasi-public by reason of the way they are financed. They are directly dependent on public funds either because the institution is sponsored or because they are commissioned only by the government (e.g. Fraunhofer-Institut e.V., Kernforschungsanlage Jülich GmbH (Jülich nuclear research plant), Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt e.V. (German Research Institute for Space and Aeronautics).

Apart from promoting research and information services, another service in the public hand is the provision of infrastructures related to air pollution control, even though these infrastructures were not set up with this intention in mind. These tasks are taken care of via "public companies", for example, which are operated by the state, typically by districts and municipalities, in the interests of the general public. Examples of these are the urban electricity works and public transport companies whose environmental policies have a considerable impact on the quality of the air.

As mentioned above, not only do public companies but also governmental departments that are not directly involved in environmental policy in the narrow sense have an indirect but nevertheless enormous impact on air pollution control. The most important of these would probably be the Departments of Economics, Energy, Traffic, and Research and Technology.

This last point concludes our guided tour through the Federal German landscape of governmental air pollution control policy, based principally on the criteria and underlying features of governmental authorities, governmental levels, governmental tasks, the matters requiring regulations, the diversity of the Laender and the manner of exerting direct/indirect influence.

2.3 Selected institutions involved in governmental air pollution control policy

The primary criterion for selecting specific institutions in the public sector was their involvement in one of the key functions of policy-making, research, inspection and control or provision of information, or that they were public companies. If they dealt with one of the first four functions, a secondary selection criterion was included in each instance (see below). It seemed logical to take two institutions per key function in order to fulfil the specified number of ten case studies. (Since one interview was cancelled, we did in fact include an eleventh institution.)

Two regional ministries were selected for the policy-making aspect. These were chosen for the reason already mentioned that the Federal Laender play the most important role in executing environmental policy. This is reflected not least by the fact that all the Federal Laender including the east German Laender meanwhile have their own ministry of the environment. A secondary specification was to be the distinction between environmental policy departments and those with departments exercising an indirect influence on air pollution control, as mentioned on the previous page. This second point is significant since there has been a heated debate in Germany since the 1970s on the organizational principles underlying environmental policy. One of the central issues of this debate is whether or not environmental policy should be integrated into the existing structure of authorities or whether special environmental authorities should be created to deal with environmental policy (see these arguments in Jaedicke et al, 1990, p. 46 ff. Baumheier, 1988, p. 160 ff.).

Bearing these considerations in mind, we selected the Berlin Senate Department for Urban Development and Environmental Protection and the Ministry of Social Affairs, Health and Energy in Schleswig-Holstein. The latter presented itself in particular because of the current debate about climatic problems.

Within the second selection criterion for institutions focusing on research, a differentiation was made between research registering air pollutants and other research on low-emission technologies. This specification could also be met. The Federal Environmental Agency with its air measurement network was selected for the first category and a regional authority, the Regional Office for Pollution Control in North Rhine-Westphalia for the second. As mentioned above, there are very few institutions under the direct sphere of influence of the government engaged in researching environmental protection and air pollution control, but these two may be counted among them.

Inspection and control functions that are mainly concerned with pollution control related to installations is understood here to mean not only the inspection of existing installations. It also covers everything dealing with authorization which likewise includes control tasks. An additional differentiation was made between centralized and decentralized inspection and control in this sphere. In view of the institutionalized structure of implementing this function, a higher regional authority was selected to demonstrate a centralized inspection office. Using these criteria, the Ministry of Nature, the Environment and Regional Development in Schleswig-Holstein and two other factory inspectorate offices in that region were selected randomly; not least due to the cancellation of one interview was the survey extended to take in a second factory inspectorate.

It was decided that group 4, the category for institutions providing information should not cover information alone but also those institutions that provide information to the public. Likewise the secondary selection criterion for this category was whether or not the provision of information was centralized or decentralized. Our choice again fell on the Federal Environmental Agency as the centralized institution, but a different section was selected this time. The Environmental Office in Frankfurt/Main was included as a decentralized authority. It is considered an excellent model for municipal information policies.

A municipal transport company from Berlin and a garbage incineration plant in Ingolstadt were selected from the area of public companies. We resorted to no further criteria for their selection apart from the fact that the activities of both firms have a definite impact on the air.

The chart in Annex 2 shows at a glance where the key functions of the ten case studies lie, the codes they were given and the interviewees in the institutions.

3. Occupational profiles in the field of air pollution control - institutional framework and practical examples in the light of case studies

3.1 Preliminary remarks about methodology

The following analysis of occupational profiles is divided into two sections. First of all the observed profiles will be presented in the context of the individual institutions included in the survey. For the purpose of the report, the individual institutions will be grouped according to the respective governmental function they (primarily) represent. Since the individual occupational profiles proved to be substantially moulded by the nature of each public institution, the case descriptions also include the key functions of these institutions. These data were provided on the whole by the respective main interviewee.

In the second stage we present the most important findings of the overall analysis of governmental functions and occupational profiles in the public sector. Both sections are structured through the methodological guidelines agreed upon. Two aspects of the guidelines merit particular note here. Firstly, a typology of occupational profiles which was used for the study on the chemical and metal industries was taken as a basis (see Nitschke/Schumann, 1990, p. 22), without it being tailored specifically to air pollution control, however. Using this schema, a differentiation could be made between the following four types of functions:

IA: Activities purely in the service of air pollution control / activities whose contents are specifically concerned with air pollution control (full-time job, e.g. head of the pollution control department in the Environmental Office);

IB: Activities purely in the service of air pollution control / activities with general contents (e.g. secretary in the section for pollution measurements at the Federal Environmental Agency);

IIA: A position not set up for the purpose of air pollution control / activities with contents specifically geared to air pollution control (part-time activities, e.g. clerk in a factory inspectorate);

IIB: A position not set up for the purpose of air pollution control / activities with general contents (integrative activities, e.g. scientific employee in a section dealing with provision of information to the public).

Type IB is of no further interest here. A list of all the occupational profiles surveyed directly and indirectly and ordered according to this typology can be found in Annex 3.

The occupational profiles were again differentiated according to "core tasks" and the "required competences" needed to perform them. An overall view of the core tasks and competences mentioned by those interviewed in the field of air pollution control resulted in two typologies, each with six main categories. These are likewise listed here. For illustration purposes, a few of the relevant tasks are given for each.

Typology of tasks in the field of air pollution control:

1. **Policy-making**

1.1 Concept, planning, development, decision-making

e.g. formulating a promotion programme, planning measures to control air pollution, issuing funds, planning new buildings, developing strategies.

1.2 Establishing ecological standards

e.g. extending existing housing construction guidelines by environmental protection aspects, laying down limits, defining air pollution control objectives, defining state-of-the-art technology, commenting on political projects of other departments/divisions.

2. **Gathering subject-related information**

2.1 Gathering primary data

e.g. measuring emissions, measuring pollution, investigating pollution processes, research on the state of technology, writing reports

2.2 Processing secondary data

e.g. reading research reports, studying relevant specialized literature, processing the contents of applications for assistance.

3. Communication

3.1 Internal communication

3.1.1 Personnel management and organization of personnel

e.g. delegating work, coordinating staff members, checking work results, recruitment, instructing staff

3.1.2 Interdepartmental (within the authority) communication

e.g. coordinating with other departments, attending relevant working group meetings

3.2 External communication

3.2.1 Cooperation in order to fulfil tasks

e.g. cooperating with higher and subordinate authorities, with research institutes, enterprises, foreign partners.

3.2.2 Public relations work

e.g. presenting own work, talks, formulating press releases

3.2.3 Provision of information to the general public

e.g. communicating data on pollutants, publishing manuscripts, delivering lectures, organizing public events

3.2.4 Guidance and answering enquiries (specific persons/groups)

e.g. "environmental telephone", organizing private events, receiving complaints.

4. Administrative examination and implementation

4.1 Application of standards to specific situations

e.g. examining applications for investment aid for eligibility for assistance, examining the prerequisites before issuing an authorization under the Federal Emission Protection Law

4.2 Simple administration work in the narrow sense

e.g. processing applications and contracts within the authorities' budget, giving notification, examining complaints

4.3 Performing other tasks

e.g. implementing instructions, processing evidence of waste disposal

5. Technical and operative implementation

5.1 Servicing and maintenance of installations

e.g. servicing measuring equipment, replacing seals

5.2 Inspecting installations

e.g. inspecting functionality of installations, inspecting measurement data

5.3 Carrying out protective measures

e.g. improvements at operational facilities, protection of plants

6. Direct inspection and control

e.g. checking that installation operators are observing limits, ensuring they comply with requirements

Typology of competences required in the field of air pollution control:

1. **Specialized knowledge**

1.1 Knowledge of legislation and administration

e.g. Federal Emission Protection Law and other statutory regulations of various scope relating to the environment, administrative legislation, administrative procedures

1.2 Technical knowledge

e.g. detailed technical knowledge, overview of the state of technology used in the installations to be inspected, technical environmental knowledge

1.3 Knowledge of natural sciences

e.g. foundations of chemistry, biology and ecology, knowledge about hazardous substances, knowledge on the effects of substances and techniques.

1.4 Knowledge of social sciences

e.g. psychological barriers to changes in behaviour

1.5 Knowledge of economics

e.g. awareness of the economic dimensions of measures, ability to assess the cost and benefit of measures in the field of air pollution control

2. Interdisciplinary knowledge

2.1 Thinking beyond the limits of one's own occupation

e.g. interdisciplinary thinking within a systematic context, a mastery of several disciplines simultaneously, an eye for overall effects, general ecological overview and outlook

2.2 Ability to orientate oneself

e.g. ability to utilize aids such as data bases, powers of comprehension, an eye for innovations, ability to separate the important from the unimportant

3. Knowledge based on experience

e.g. availability of practical experience gained from a related occupational activity or many years of work in the respective department, knowledge of important institutions, awareness of what is technically feasible, knowledge of "administrative tricks"

4. Competence in taking action and communication skills

4.1. Ability to convince people

e.g. ability to reason in writing and orally, talent in presenting opinions and subject matter

4.2. Cooperation and communication skills

e.g. ability to relate to the public and other members of staff

4.3 Assertiveness

e.g. persistence in dealing with enterprises (during inspection and control), assertiveness in dealing with members of staff and with other authorities

5. Motivation, attitude, awareness

5.1 Environmental protection attitudes

e.g. positive attitude towards environmental protection, commitment to environmental protection, motivation to protect the environment, internalized stance

5.2 Positive attitude towards "serving the state"

e.g. loyalty towards employer, correctness

6. Competences in the narrow sense

e.g. manual skills, knowledge of electronic data processing

Categories 1 and 2 comprise specifications called "qualifications" in earlier CEDEFOP work. The competences listed under Points 4 and 5 come into the category of "social requirements and attitudes" as understood in CEDEFOP terminology. "Competences in the narrow sense" originate directly from this nomenclature.

For reasons of space and priorities, in our report on the individual occupational profiles we have not presented all the data on tasks and required competences nor all other relevant information which we collected in the course of our work. However, the list of the occupational profiles in Annex 6 contains most of the information provided on the basis of the interview checklist. The tasks and competences mentioned are ordered and generalized according to the described typologies, however.

Seen overall, the analysis of the tasks was given higher priority than applicants' competences and their biographical backgrounds.

3.2 Presentation with reference to individual cases

3.2.1 Policy-making

3.2.1.1 Section within the Senate Department for Urban Development and Environmental Protection, Berlin

Institutional framework

The executive power in environmental policy lies primarily in the hands of the Federal Laender which have now all established environmental ministries of their own. The Berlin Senate Department for Urban Development and Environmental Protection has been selected here as an example of an environmental department at Laender level. According to statements made by the main interviewee (1Aa), this authority has been in existence since 1981. It deals mainly with urban development, open space planning, regional planning and inspection and control. Environmental counselling, testing of environmental soundness and supraregional aspects of environmental protection come under its jurisdiction as well. In West Berlin alone, within the old city borders, this authority had 800 on its payroll; since unification it has increased its staff to about 1 400. The Senate Department for Urban Development and Environmental Protection is bound to federal legislation in matters to do with air pollution control. It is responsible for installations requiring official authorization according to the Federal Emission Protection Law.

The Department consists of two governmental offices, one for planning, the other for environmental protection; each of these is subdivided into three divisions. The section we have investigated is one of three in an environmental protection division. Unlike the other divisions, this one is not subdivided according to individual environmental criteria but according to superordinate aspects. The section which has existed in its present form since 1987 is called the "Environmental Research and Technology Development, Soil Protection Programme, Testing of Environmental Soundness and Environmental Chemicals" section; the name was lengthened even more after the recent change of government. As its name indicates, the section does not pursue a policy specific to air pollution control but has a decidedly superordinate approach. Nevertheless, we chose this section since all the preliminary information we had indicated that the steps taken there could be classed as a classic example of policy-making.

The section is actively involved in policy-making at two levels. It contributes to extending and improving regulatory instruments in the ecological field (e.g. maintenance guidelines in housing, formulation of substance-related requirements, initiatives to prohibit CFC, environmental soundness testing). In addition and above all, it draws up and implements promotional programmes (e.g. environmental research, technology development). Although such programmes have to be adopted by governmental organs, there is certainly scope in developing them as well as in distributing funds for them.

The best known example of such a programme is the "Berlin Environmental Promotion Programme" sponsored by the EC. This programme is aimed at small and medium-sized commercial and industrial enterprises which contribute more than their share to environmental pollution. The programme's investment aids aim at providing direct relief as well as improving framework conditions (e.g. further training, creating communal facilities). Projects that would be relevant to air pollution control and worthy of support would be the construction of block heating power stations, effective steam generation from waste heat and the installation of CFC-free metal degreasing.

How the section is organized

The section has 17 full-time employees who work in four groups; 14 of them have university-level qualifications. The areas in which the graduate personnel has specialized are decidedly interdisciplinary (e.g. biology, landscape planning, construction engineering, economics, foodstuff chemistry). Since the section has an influence on air pollution within the scope of concepts on "integrated environmental protection", it is not surprising that its contributions to emission reduction at the level of occupational profiles (function type IIB) are also only "integrative" within the framework of existing tasks. Team work plays a major role.

In this section, the occupational profiles for the head of the section, the team leader of the environmental promotion programme and the leader of the "administration" team were indirectly surveyed. The core tasks of the section head take in brainstorming for programmes, political coordination and public relations work. Correspondingly, competences such as negotiation and organizational skills are required as well as specialized knowledge. The team leader of the environmental promotion programme is more in need of specialized qualifications as she is directly responsible for examining applications and writing reports.

Deputy head of the section (1Aa)

The main interviewee is the deputy head of the section who was recently given civil servant status (Beamter). His occupational profile is summarized in Annex 6.1. (The other profiles are listed there in order of their appearance in this chapter). His core tasks take in examining research reports, programme planning, coordinating with other divisions, drawing up statements on political projects, reading and evaluating applications for assistance as well as delegating work within the section. In order to fulfil his tasks, the interviewee considered it important to have specialized knowledge of environmental protection, institutional knowledge of authorities and the economy and their interaction, social skills as well as a personal stance on environmental protection. The interviewee is a qualified environmental technician by profession. Further training related to environmental protection ensued only informally.

Administrative clerk (1Ab)

The interviewed administrative clerk has an astonishingly broad spectrum of tasks, considering her official position. Along with budget and administrative tasks in conjunction with processing applications for assistance in various programmes, she also does various types of coordination work in the new "Ecological Rehabilitation Programme" (interdepartmental financial and contractual control; selection of personnel for job-creation measures; public relations work). When asked what the most important competences required in her job were she mentioned "recognizing what is important", composure, environmental awareness and the ability to work in a team and to assert herself.

The interviewee has only recently started working in the section. Her interest in environmental issues led her to apply for the advertised post. She had previously worked for a long time as an administrative clerk at a university and as an office clerk in a business. She completed a relevant specialized training course for clerks in the public service. Later, she even studied social psychology and education. It can be concluded that the spectrum of her tasks is so broad because she makes a very committed impression and because she is highly qualified compared to other medium-level administrative clerks.

3.2.1.2 A division of the Ministry of Social Affairs, Health and Energy

Institutional framework

Our second case study for the policy-making function is also a Federal Land. In this case, we have selected the territorial Land of Schleswig-Holstein. In keeping with the random sampling requirement, we purposely did not choose a strictly environmental department but one dealing with environmental protection tasks as part of other competences. The choice fell on the "energy economics" division of the Ministry of Social Affairs, Health and Energy. (Within the Ministry, there is also second energy-related division dealing with nuclear reactor safety.) The energy economics division was created in 1988 after the state parliament elections with the aim of implementing the energy policy of the Land. The division's tasks take in energy planning especially in regard to renewable sources of energy and decentralized power generation, counselling in the energy sector, conducting relevant promotional programmes (e.g. energy saving), supporting research in the energy sector and also providing information to the general public.

The work of the division includes a supervisory function as well, i.e. monitoring prices. How relevant the division is to air pollution control is seen in the emission-reducing effect of energy saving and the use of non-fossil fuels. The same holds true for the contribution made to the preservation of the earth's atmosphere.

Unlike the section of the Berlin Senate Department, the work of the energy economics division has to be characterized as multi-functional. Policy-making is only one of its functions; functional division of labour cannot be practised as extensively as in a specialized department. Their work is not only targeted at companies and private individuals but also at power supply utilities and municipalities. The wider approach of the division is further reflected in the importance attached to coordinating measures nationally and internationally.

How the division is organized

The division consists of 20 persons who are classified either as experts or clerks. As was the case in the Berlin Environmental Department, both the large number of highly-qualified employees (even among clerks) and the great diversity of subjects in which they have graduated are striking. The main interviewee considers the available staff resources as far too paltry in view of the broad scope of their tasks. He also feels that federal legislation strongly restricts the implementation of objectives such as decentralized power generation.

The employees' activities must again be characterized as "integrative" with regard to the environmental protection task of air pollution control. While fulfilling their energy policy tasks, the experts and clerks do something for air pollution control. This holds true not only for the head of the division as a lawyer but for the other employees as well. Judging from the indirect survey of a few occupational profiles, much of the staff had already obtained relevant qualifications before being employed here. For example, the clerk responsible for the promotion of regenerative energy concepts had completed studies as a process engineering technician and then had worked in a factory inspectorate. The expert for renewable sources of energy had been employed in a building firm for years. The expert for energy control had previously been employed as a clerk in a power supply utility.

Expert (1Ba)

The variety of tasks handled by the division is reflected in the employees' awareness and perception of problems. This at least could be one way of interpreting the fact that the directly interviewed expert showed a very comprehensive insight into energy policy, in which technical, bureaucratic, political, economic and psychological limitations must be taken into equal account. The expert is not only responsible for conceiving promotional areas in energy planning and energy counselling, for organizing energy research and for international cooperation in the field of energy policy. He is also responsible for programme organization, processing applications and providing information on saving energy. The multifunctionality of the division is reflected in the multifunctionality of the occupational profiles.

Beside relevant legal knowledge (construction laws, energy economics regulations, etc.) the expert stressed that important aspects of the competences he required were institutional knowledge of factors that hinder behavioural changes, creativity, communication talent, a "feeling for administrative tricks" and the ability to assert himself. Before he started working in this administrative position four years ago, the expert, a qualified engineer for urban and regional planning, had been employed for some time at an institute specialized in research and policy counselling.

Clerk (1Bb)

The second interviewee is a clerk for energy planning and counselling. Ih this position, he assists both his supervising expert and the head of the division. His counselling work mainly takes in helping Land municipalities to develop energy concepts and providing advice to consumers on projects that they are conducting themselves. His area of tasks also includes running pilot projects in the field of alternative energy sources. To fulfil these tasks, he said he requires knowledge of economics, practical experience, administrative knowledge, electronic data processing, a personal stance on environmental protection, the ability to assert himself and presentation skills. The interviewee is a mechanical engineer and gained relevant occupational experience (in an electricity supply company). He apparently had no specific environmental qualifications.

3.2.2 Research

3.2.2.1 Pilot station in Frankfurt in the air measurement network of the Federal Environmental Agency

Institutional framework

A Frankfurt branch of the Federal Environmental Agency based in Berlin was selected as a case study for "pollutant detection" research function in the field of air pollution control. This branch acts as the headquarters of the nation-wide network for measuring air pollutants. The Federal Environmental Agency was founded in 1974 to render scientific support to the Federal Ministry of Environment, Nature Conservation and Nuclear Reactor Safety under which it was directly set up. Consequently, research has a central position in the work of the Federal Environmental Agency. General provision of environmental data and information to the public on environmental issues are also among the set objectives of the Agency. Sometimes the Federal Environmental Agency even assumes executive tasks (protection against chemicals and radiation). Unlike the two ministries at Laender level, the Federal Environmental Agency has no subordinate offices.

In the field of air pollution control the Federal Environmental Agency is active in research to advance the state of technological development; it drafts relevant statutory regulations and counsels authorities in implementing these.

In 1990, the Federal Environmental Agency had more than 600 on its staff, more than 300 of whom were public servants (Beamten) and 250 other white-collar workers. Over 140 new posts were created in the Agency after unification. Among the 416 persons who have completed higher education, natural scientists predominate (228); 141 persons come from the technical sciences while only 47 have studied humanities, social and planning sciences (calculated according to a publication of the Federal Environmental Agency 1991, p.7). The authority is basically divided into three specialized sections, one of which focuses on keeping the air clean and noise abatement. Each section is subdivided into groups, each group into specialized fields. A total of 13 specialized fields from two groups are directly involved in air pollution control. The above-mentioned pilot station in Frankfurt belongs to the specialized field of "measurement of pollutants, measurement network" which is part of the group called "common affairs air/noise, planning, inspection and control of the air". Division of labour and subdivisioning of subject matter within the authority is taken a level further than at the Berlin Senate department.

The specialized field concentrates its work mainly on air pollution in rural regions while air pollution in conurbations is primarily handled by the Laender. Its tasks include comprehensive recording of serious air polluters, controlling the quality of measured values, evaluating measurement data and writing relevant reports. Concrete examples of these activities are its contribution to the establishment of an early smog warning system and monitoring the observance of international conventions. International cooperation is very important (e.g. observing pollutant transports crossing borders). The main interviewee characterized the work of the specialized field as that of a mediator between research and application.

How the pilot station is organized

The specialized field has eight manned branches (and 30 unmanned measuring stations). There are over 60 positions allocated to the entire specialized field; 28 persons are employed at the headquarters of the "pilot station" in Frankfurt and another 28 in the remaining branches. The majority of them work in the higher and upper echelons. The pilot station or more appropriately, the entire specialized field is an institution which deals exclusively with tasks related to keeping the air clean, and as such, it differs from the cases described above. As a result, occupational profiles of the types IA or IB are the only ones we will find here. Examples of the latter type would be a driver or a secretary, but they are of no interest to this study.

The main group, type IA, is represented for instance by measurement technicians, who carry out measurements and look after test vans and stationary measuring posts. Qualifications required for such a position would be a degree in process engineering or completion of studies at a technical college. Five meteorologists also work at the pilot station as scientific members of the staff. Their tasks concentrate directly on measurements, their own surveys, looking after measuring instruments and presenting findings to others. Beside specialized qualifications, the competences required for this work include administrative knowledge, electronic data processing, foreign languages and communication skills at an international level. Similar qualifications are expected of the two chemists, who are responsible for the laboratory, plan substance analyses and also assist in taking measurements. The head of the specialized field, who works in the administration headquarters, mainly has coordinating tasks. Nevertheless, he also has a relevant professional qualification (meteorology with a focus on air-chemistry, pollution measurement technology).

Compared with those sections of the authority dealing with policy-making, it is striking here that the composition of the specialized scientific staff is much more homogenous, thus reflecting the special competence of this specialized field.

Head of the measurement network (2Aa)

The main interviewee is head of the measurement network and all its branches while also serving as the deputy head of the specialized field. He is responsible for the technical supervision of the measuring stations. This entails their proper operation, planning of new stations, electronic data processing and replying to inquiries. Scientific work (evaluation, publishing, lecturing) apparently plays a major role. A great deal of this work is based and dependent on national and international cooperation. Due to the strong external orientation of the work, this occupational profile goes beyond pure research to include counselling on policy and provision of information. The subsidiary functions of the specialized field also find concentrated expression in this occupational profile.

The required competences already mentioned (basic knowledge of natural sciences, electronic data processing, foreign languages, administrative knowledge) needed for the job as well as those skills needed for personnel management and attractive presentation. In addition to the relevant specialized studies (doctorate in meteorology), the interviewee had several years' experience in a corresponding post in a foreign environmental authority to his credit as well as qualifications in air pollution control acquired at further training courses.

Clerk (2Ab)

The interviewed clerk is a technical employee. Her work is clearly of an active nature while contributing to the planning of activities is of rather marginal importance. The interviewee is responsible for recording the data coming in daily from the measuring stations, electronically processing it and passing this information on. When the smog level is critical, the rhythm of respective activities is accelerated to intervals of three hours. Thus, she is involved in preparing smog forecasts. Her job also includes data base service, replying to inquiries, calculating trends and preparing graphs and diagrams. Compared with the administrative clerk (1Ab), the clerk described here has far less scope for action.

It is not quite clear whether or not the tasks are specifically related to air pollution control. If they are not, this job has to be assigned to function type IB. Since the interviewee indicated she performs higher "quality" work than stipulated, it might well be that her work is thus enriched when it comes to subject matter. The electronic data processing part of her work is mainly what is extended, however. She chiefly regards knowledge of electronic data processing, flexibility in dealing with technical innovations and technical English as necessary for fulfilling her tasks. Environment-specific qualifications are obviously not significant. Untypically, the clerk is a skilled chemical laboratory assistant (while comparable clerks have higher qualifications). She acquired her competences in the field of electronic data processing autodidactically and by attending EDP training courses.

3.2.2.2 Regional Office for Pollution Control

Institutional framework

Similar to the Federal Environmental Agency, the North Rhine-Westphalia Regional Office for Pollution Control has no authority to issue directives. To the best of our knowledge, this institution, which was established at the Land level in 1963 and has its headquarters in Essen, is the only one of its kind in the country. It comes under the control of the corresponding Ministry of Environment in North Rhine-Westphalia. Presumably, the existence of the institution can be traced to the historical role of the unusually high concentration of air pollution in the Ruhr district. This is also reflected in the surprisingly large size of the organization which employs about 450 persons.

Here we face the extraordinary case that the entire institution focuses its efforts on air pollution control (and noise abatement). Beside research work its tasks also cover counselling of authorities and providing information to the public. The regional office was incorporated into the survey because part of its work comes under the specified criterion of "research into clean technologies". This type of research is conducted in one of the six divisions; it does, however, overlap considerably with research activities aimed at detecting pollutants. The respective division is called "Air Pollution Control Technology, Accident Prevention". The division is subdivided into two groups which again consist of several specialized areas. The hierarchy of organization resembles that of the Federal Environmental Agency. Other divisions deal for instance with pollutant measurements and effects analyses.

The directly surveyed occupational profile comes from the specialized area "Heating Installations, Extraction and Processing of Metal, Rock, Stone and Related Mineral Products and Disposal Plants" which belongs to the group "Prevention, Abatement and Exploitation Technologies". Thus, the orientation of the smallest units towards problems related to sectors and installations corresponds to organizational structures at the Federal Environmental Agency.

The objectives of research activity in this specialized area or rather, in this division is to find substitutes for heavy-emission technologies. However, research is not directed at developing environmentally friendly technologies as such. It is far more concerned with laying down "state of technology" as a legal term and advancing this standard in specific industrial sectors. Analyzing the efficiency of filters can be mentioned here as an example. Future plans include analyses in the field of heat utilization and the use of residues for reducing emissions. Consequently, restriction of their work strictly to pollution control has been abandoned as a result of changes in legislation and at the request of the head authority that they develop an integrated approach to solving problems.

Compared with the research described above, the type surveyed here is understandably orientated towards the sources of pollution. International integration of the work does not play an important role. Cooperation with industry tends to be more intensive than with other research institutions.

How the research section is organized

Apart from the head only two technical clerks are employed in this specialized area. Judging by the composition of the staff as a whole, fewer numbers of higher-grade staff are employed in the specialized area, group and division (similar to the Federal Environmental Agency) than is the case in policy-making. With regard to their air pollution control tasks, they may again be classified in function types IA and IB. The interviewee mentioned the head of the division and the group leader as examples of type IA. Both must fulfil within their respective scopes of competence coordination and external communication tasks, thus pushing the purely specialized activities somewhat into the background. Yet, in comparison, the group leader needs more specialized qualifications. In principle, a basic grasp of the subject matter is sufficient. Administrative knowledge and financial thinking are of more importance. Both the head of the division and the group leader studied metallurgy. While the head of the division used to work in an executive capacity at the factory inspectorate, the group leader has experience in the industrial sector to fall back on.

Head of section (2Ba)

Besides carrying out research work frequently related to specific projects (e.g. dioxin measurements to ascertain the technique with the lowest emission rate in garbage incineration), the interviewee is also required to reply to external inquiries. The specialized tasks range from determining the technical level of certain plants and the preparation of reports and statements. He is also in charge of coordination within the specialized area. Reporting on his own work to others seems to be only of minor importance.

The interviewee pointed out that "having an eye for all the effects of an installation" was needed for the job and is the prerequisite for "optimizing the whole system". He also said that legal knowledge and electronic data processing were required. It was also important to stand up for measures one considered important in order to obtain funding. Environmentally related motivation could be more of a hindrance than a help, he thought. The chief clerk is a qualified chemical technician with professional experience in industrial engineering.

3.2.3 Inspection and control

3.2.3.1 Ministry of Nature, the Environment and Regional Development

Institutional framework

Since the bulk of the responsibility for carrying out inspection and control lies in the hands of the departments of the environment in the Laender, the survey had to concentrate its efforts for this function at the Laender level. The stipulation that we consider both a centralized and a decentralized institution with inspection and control tasks was sensibly met by selecting a Federal Land since the direct division of labour between the different authorities becomes quite apparent.

The Ministry of Nature, the Environment and Regional Development in Schleswig-Holstein was selected as an example of a centralized institution. This authority has only existed since 1988. It is responsible for implementing Federal laws on the one hand and fulfilling planning tasks at the regional level on the other. The instruction and control tasks are divided up according to individual environmental criteria and the laws related to them and assigned to the different divisions of the Ministry. This Ministry also follows an intercriterial approach which is firmly anchored in the institution. For example, there are special divisions for "intercriterial environmental policy" and for "ecological technology and ecological economics".

A total of 220 persons work at the Ministry, far fewer than in the Berlin Senate Department before unification (although the population of Schleswig-Holstein exceeded that of Berlin at the time). This indicates the considerable differences among ministries of the environment in the various Federal Laender even pertaining to quantity. The small size of the Ministry in Schleswig-Holstein might be due partly to its later founding date and also to the fact that more tasks were transferred to the factory inspectorate.

The tasks of air pollution control are within the sphere of responsibility of the "Work Environment, Pollution Control" division. Unlike in Berlin, the Ministry here bears direct responsibility only for those installations which are not subject to official approval according to the Federal Emission Protection Law. Otherwise it supervises the subordinate inspection and control authorities, coordinates them and issues them directives. That means the inspection and control functions also imply planning and policy-making components, the implementation of which is preferably assigned to working teams especially created for this purpose. Policy-making is expressed, for example, in guidelines that set the priority for inspecting and controlling various types of installations. The main interviewee pointed out, however, that the deficiencies in carrying out these tasks erect a rudimentary barrier to the scope of policy-making. One reason for this deficit seems to be the absence of a middle level of administration between the Ministry and the factory inspectorates such as exists in most other Federal Laender.

Compared with the functions mentioned above, external communication is in our opinion of much less importance.

How the division is organized

The division allocates one half of its staff to dealing with work protection and the other half to pollution control. A total of 28 persons are employed there, including 13 experts and 14 clerks. The posts of the experts are high-grade ones. According to the main interviewee, 13 persons deal primarily with air pollution control. Consequently, these could be most easily classified as function type IA employees. The others deal with air pollution control only peripherally, and then less in the sense of a part-time occupation (IIA) but rather as an integrated part of their job protection tasks. Purely administrative staff does not seem to exist in the division. The high level of formal qualifications throughout is also striking just it was in the energy economics division of the other Land department.

The head of the division has the typical management tasks as described earlier. Interesting in his case is his untypical qualifications as a lawyer. Altogether, there are three lawyers working in this division. The others have completed higher education in natural sciences and engineering. One of the experts is responsible for pollution control related to installations. In keeping with the statements made above, he himself is not responsible for the actual inspection and control of the installations but for its organization in accordance with certain specifications set down in the policy of the Land (e.g. the regulation relating to waste-heat utilization for installations requiring official approval). This expert is a qualified metallurgical engineer.

Expert (3Aa)

The main interviewee is an expert in the division at the level of a senior government official. His area of tasks takes in mainly the basic affairs of the factory inspectorates. For example, he holds meetings with the heads of the inspectorates, defines their tasks, establishes standing orders and determines the staffing requirements of the individual offices. In this function he can be classified under function type IIB. He is also responsible for the direct inspection and control of installations, however, in which he is assisted by clerks. He dedicates a quarter of his working hours to those tasks directly related to air pollution control. This part of his work is a part-time occupation (IIA). Thus, the interviewee represents two types of function at the one time.

In his opinion, the necessary competences are the first five points in the spectrum of competences appearing on pages 28 - 30. This is why the many individual statements he made are not listed here separately. Judging by this, the requirements for the job seem to be very diversified. In order to meet these requirements, his former job in the factory inspectorate would have equipped him well for this position, if indeed it was not a prerequisite.

Clerk (3Ab)

The interviewed clerk is a direct subordinate of the expert described above. A large portion of his working hours is needed to put the concepts of his superior into practice. In addition, he handles complaints from the general public and processes statements requested by other authorities. For this purpose, he often resorts to special sources of information (data bases). As with his superior, he seems to embody a mixed functional type, with the focus placed on "part-time" competence for air pollution control.

The interviewee mentions technical and legal knowledge and motivation as competences required for this job. An interdisciplinary view is desirable. The interviewee used to be a steel construction fitter. With the help of relevant training courses, he worked his way up into the upper echelons of the technical service staff. As part of his further training he also attended courses on technical aspects of environmental protection.

3.2.3.2. Factory inspectorate in Schleswig-Holstein

Institutional framework

In the Land of Schleswig-Holstein, there is a total of four factory inspectorate offices. Other Federal Laender with larger populations have many more offices of this kind. As the name indicates, the function of the factory inspectorate goes far beyond environmental protection tasks (monitoring hygiene standards, work protection). In Germany, the factory inspectorates have a 125-year history to look back upon. Environmental protection has become an explicit task area only in recent years. Statutory regulations such as the Federal Emission Protection Law and the Technical Instructions for Controlling Air Pollution have led to a sharp increase in tasks relating to environmental protection. Matters relating to water legislation are assigned to other authorities in Schleswig-Holstein.

For the purpose of the survey, our primary choice fell on the Itzehoe factory inspectorate because it is responsible for a region where many pollutant installations are located. The tasks of the inspectorate (in the field of air pollution control) take in examining applications for installations requiring official authorization, granting such authorization on fulfilment of relevant requirements as well as the direct inspection and control of companies (in particular with regard to their emissions).

Beside the principle of regional competences, there seem to be subject-related competences also, which have emerged from the respective fields in which the individual inspectorates have specialized.

The inspectorate in Itzehoe has five divisions and employs 110 persons, about 50 of whom are technical assistants and supervisors (only six of them rank as high-grade). Of the four divisions which are characterized by the subjects they deal with, there is a division of environmental protection called the "Division of General Pollution Control". A second division is responsible especially for pollution control in chemical plants in a subregion (chemical plants are of above-average importance there); a third division deals with the technical aspects of work protection and a fourth one with the social aspects of work protection. In addition there is an operational group called "Inspection and Control of Air Hygiene" which operates its own measurement network.

As already mentioned in connection with the last case study, the factory inspectorates are obliged to follow the laws and directives issued by the Ministry of the Environment. They can only make independent decisions on which companies and plants to inspect and when the inspection should take place. Due to staffing shortages, inspections can only be randomly made, all the more so as the spectrum of installations to be inspected is expanding steadily.

How the pollution control division is organized

There are 27 employees engaged full-time in pollution control, five rather peripherally with it. We are primarily interested in the "General Pollution Control" division which consists of the head and seven clerks. Tasks are distributed internally according to the system determined by the Federal Emission Protection Law. In principle, the tasks they have to accomplish are the same, only the subjects of inspection, control and authorization may vary. In the case of complex authorization procedures (e.g. because of the size of the installations, their complexity or toxicity) special working groups are formed.

It is hard to group the clerks into a particular function type. On the one hand, they work in a division which from its very title refers to air; on the other hand, they have tasks which go beyond pollution control with regard to the installations under their jurisdiction. The first part of their work could be classified as function type IA, the second rather as function type IIB.

One person in the division is responsible for agricultural building projects, for instance. He has to inspect large-scale livestock farms to ensure compliance with statutory requirements for pollution control. In order to fulfil this task, he primarily needs legal knowledge and knowledge of the effects that livestock farming and its pollutants have on the environment. Others monitor air pollution caused by power and heat generating plants. Similar to the second type of function research, the state of technological development has to be assessed here as well. An engineering degree and occupational experience gained in industry are important prerequisites for the job. In addition, all upper and higher-grade employees have to complete two-year preparatory service to acquire civil servant (Beamte) status.

Head of the Pollution Control Division and Head of the Environmental Protection Group (3Ba)

The main interviewee is head of the pollution control division and directly subordinate to the head of the inspectorate. His tasks consist of coordinating the clerks' activities, examining the concluded processes to ensure compliance with statutory criteria relating to environmental protection and administration, setting inspection and control priorities and communicating externally with companies and other authorities. Sometimes he deals with processes himself. The interviewee considers the following competences in particular as necessary for his job: legal knowledge, knowledge of technical alternatives, "an eye for the interaction between all installations", a neutral steadfastness towards enterprises and the power of persuasion. Before starting his job in the inspectorate he worked in industry (production, plant engineering) and prior to that he had studied process engineering.

Clerk (3Ca)

The second interviewee comes from the factory inspectorate in Kiel which has only 46 employees. In contrast to the inspectorate in Itzehoe, the skilled staff is divided according to the installations in specific industrial groupings in which they have specialized. Their work often takes them beyond the limits of their own specialized group. There are no specialists for air pollution control in the authority. Whether or not a person is competent in this area depends on whether or not the installation is relevant as far as pollution control laws are concerned. Consequently, those persons dealing with pollution control can be classified as representing function type IIB.

This also holds true for the clerk interviewed in the Kiel inspectorate who estimated that half of his working hours were spent on environmental protection. His special field covers authorization, inspection and control of installations in the fields of energy, heat generation, mining, garbage incineration and test stands for combustion engines. His work is normally desk-work. Only in rare cases does he conduct on-site inspections. Normally, he does not carry out measurements himself. This type of work is contracted to officially recognized institutions such as the TÜV (Technical Inspection Association). Cooperating with other authorities plays an important role in authorization procedures.

The interviewee considers legal knowledge, specialized knowledge about the effects of substances, many years of professional experience and having "correct but reserved" dealings with enterprises important for his job. After graduating as a chemical engineer, this clerk also completed preparatory service.

3.2.4 Information

3.2.4.1 Federal Environmental Agency

Institutional framework

Once again the Federal Environmental Agency was chosen as an example representing a centralized institution with the task of informing the public. This time, however, a different sub-unit of the Agency was selected. We chose the Federal Environmental Agency because it is quite simply **the** centralized information centre, and ministries of the environment of the Laender do not pursue an information programme that compares in any way with theirs.

Similar to the research function discussed under Point 3.2.2.1, the type of information function surveyed here is established at the level of a specialized field. It is called "Educating the Public in Environmental Affairs". It is one of four specialized fields of the "General Environmental Affairs" group and belongs to the specialized "Environmental Planning, Ecology" section which includes three other groups. In addition to this specialized field some other specialized sections also play a major role in providing information to the public. These include the "Socio-scientific Environmental Affairs" and the "Environmental Literature and Research Documentation" sections and the "Central Specialized Library". We decided, however, to select the specialized field first mentioned since its description complied most closely with the guidelines for our survey.

How the specialized area is organized

Twenty persons are employed in this specialized field. Only two of them are classified as high-grade. One-half of the staff is not specialized. They are responsible for the "Central Letter Answering Service" for enquiries sent in by the general public. Only two persons, namely the head of the specialized field and his deputy, are engaged in drawing up contents and concepts for PR work. The others are charged with promoting associations, i.e. promoting projects in non-governmental, non-profit-making environmental protection organizations.

The information function includes the following activities: replying to letters and answering telephone enquiries (altogether more than 100 000 per year), publishing a scientific periodical and organizing fairs and exhibitions. The information work is mainly differentiated according to the various types of information media. Classic printed media (books, brochures, leaflets, posters) predominate. Documentary and feature films are also released. The distinction between various target groups is a secondary factor. A differentiation is made between "specialists", "multipliers" and "the man in the street".

Information on air pollution control is obviously an inseparable part of the general public education (even though brochures for specific environmental media are of course available). Consequently, the activities of the two specialists with regard to air pollution control must be designated as integrated work (function type IIB). The other employees in the specialized field do not actually work with the real issues of air pollution control. Of course, the provision of special information about keeping the air free of pollution is in the first place the job of the corresponding specialized section, so that some of the working time of the personnel in this area also serves the general provision of information to the public. This is the intention of legislation.

The budget for educational work at the actual disposal of the specialized field is considered to be very limited.

The head of the specialized area has a relatively large number of administrative tasks. He acquired the qualifications necessary for this job through his studies of economics completed at an institution of higher education and several years of professional experience in the field of journalism/editing. The staff dealing with promoting associations are supposed to have completed administrative studies.

Deputy head of specialized section (4Aa)

The interviewee is employed as a scientific assistant and is deputy-head of the section. Her work is primarily characterized by conceptual planning. These tasks have already been described in principle in the paragraph on PR work. The interviewee covers all the areas mentioned above. In addition, she is responsible for representing the Agency to visiting groups as well as for all the communication tasks connected with the use of the described information resources (e.g. contact with publishers, public opinion researchers, advertising agencies, internal specialized divisions).

The orientation towards conceptional work allows her a relatively large degree of freedom. Unlike in the case of scientific publications (see Point 3.2.2.1), all work published by the PR office is checked. Up to 30% of PR work is laid down "from above" (additional information received from an interview in the policy division).

According to the information given by the interviewee, her work requires knowledge about relationships related to environmental protection, basic journalistic skills, organizational talent, administrative knowledge, negotiation skills as well as an innate ecological motivation, inquisitiveness and "a feeling for the spirit of the time". Before starting her job in the PR area, the interviewee worked in another specialized section where she dealt with identifying environmentally friendly products. She studied chemistry and political science.

3.2.4.2 Environmental Office Frankfurt/Main

Institutional framework

The Environmental Office in Frankfurt/Main was included in the survey as a decentralized information centre at municipal level. According to relevant preliminary information, its record in PR work is outstanding. The Office has been in existence since 1989, since the beginning of the "red-green" coalition. Prior to that there was only an environmental section within the municipal council. The activities of the Office, which is under the jurisdiction of the Frankfurt Department of the Environment, Energy and Fire Protection, are strongly influenced by municipal policies. Federal German legislation provides for a certain scope in environmental policy at the local level also.

The Environmental Office not only handles PR work, it also deals with inspection and control. The four divisions are named according to the subjects they deal with: "Environmental Inspection and Control", "Preventive Care of the Environment", "Sewage Control" and "Information and Counselling on Environmental Affairs". The Office has about

100 employees.

Informational services for air pollution control are dealt with by the information division in cooperation with the specialized "Emission Protection" section which belongs to the "Environmental Inspection and Control" division. The tasks of the specialized area mainly cover planning of air pollution control (assessment of plans, above all in the building sector, development of strategies for air pollution control, planning of measurements) as well as the administrative activities of air pollution control (e.g. direct inspection and control, dealing with complaints). Work on the former helps to establish a technical basis for educational work which is normally left to the division set up for this specific purpose. An example of this is the compilation of information on PER pollution in the environs of dry-cleaning enterprises.

The "Information and Counselling on Environmental Affairs" division provides an advisory telephone service to private households and organizes multiplier events, major public events and individual campaigns (e.g. "Frankfurt drives lead-free"). It publishes "environmental tips" and issues local measurement data daily.

How the relevant sub-units are organized:

Only three persons work in "Emission Protection" instead of the intended six. One engineer is, for instance, responsible for the smog alarm plan, the technical planning of "blue traffic lights" (a concept for reducing motor vehicle emissions) and for problems relating to asbestos. He works completely in the service of air pollution control (function type IA). Technical knowledge is the most important qualification required for this job. The person in question is a qualified public health engineer. He has attended various further training courses on the subject of environmental protection. Apart from general administrative tasks, the administrative clerk is responsible for the inspection and control of heating installations. Thus, he represents function type IIA. As might be assumed, he requires administrative knowledge, knowledge of laws relating to the environment, and courage and steadfastness in administrative procedures. He underwent training in administration.

Seven persons including the head of the sub-unit work in the actual information division. As is the case in the Federal Environmental Agency, there is no position specifically set up to provide information on air pollution control to the public. If an employee specializes at all, then it is purely according to his/her individual inclinations. Providing information on air pollution is integrated into the individual tasks (type IIB). At most there are part-time functions which might be classified as function type IIA such as at the moment when air pollution control is raised to the status of a politically important topic, so an environmental counsellor is now working part time on it.

An example of a type IIB function is an environmental counsellor working on the subjects of "environmentally friendly procurement" and "waste". She is a qualified computer scientist. Another member of the staff is responsible for nature conservation issues. The head of the division is mainly responsible for organization and coordination. Her work requires more administrative than specialized knowledge, a talent for writing and managerial abilities. After completing studies in engineering, she gained professional experience in administration at a ministry and as the manager of a small enterprise.

On the whole, it is striking that such a large number of those employed in the information section have acquired environmental qualifications. Most of them have obtained a teaching degree as well (teaching qualifications with at least one subject in the natural sciences). With the exception of the head, all employees are called "environmental counsellors".

Head of department (4Ba)

The main interviewee is head of the Pollution Control department. She has a wide range of tasks such as personnel management, coordinating inspection and control, defining and planning new projects and strategies, processing data for publishing, writing expertises and issuing specialized information on her work. The development of a city climate model seems to be a typical project with policy-making character.

Compared with many other managerial posts, it is remarkable that the managerial tasks here are not extremely restricted with regard to their contents. From the range of tasks involved, this occupational profile would appear to be the broadest. The functions of policy-making, research, inspection and control and information are united here in one position. This may have to do with the overall function of the authority, which in its role as a decentralized institution, has to deal with all the relevant tasks. Cooperation with other pertinent institutions plays a major role.

According to the interviewee, the competences required for her job are legal and administrative knowledge, knowledge of natural sciences, quick comprehension and orientation abilities, institutional know-how, social skills, high self-motivation and a pioneering spirit. Within her meteorology studies, she specialized in air climate and air chemistry. Later on she attended a varied assortment of training courses relating to her profession.

Environmental counsellor (4Bb)

The second interviewee works in the "Information and Counselling on Environmental Affairs" division. Along with other tasks, he counsels per telephone, issues the environmental tips of the week and runs various projects. For instance, he organized a series of events on the subject of "air pollution control through a different energy policy". Furthermore, he works out specialized sessions for schools. Private individuals and communities take advantage of this counselling service (e.g. on questions of procurement). However, much of the administrative work is delegated "from above", greatly restricting the degree to which this employee can regulate his own work. External cooperation is also of great importance in this job.

He indicated that his work required knowledge of law, electronic data processing, basic knowledge of natural sciences, communicative ability, organizational skills, flexibility, imagination and a high level of motivation. After completing teacher training, the interviewee acquired an additional qualification as a specialist in environmental affairs by attending an officially recognized long-term course to become an environmental counsellor. Informal further training is likewise of great importance.

3.2.5 Public companies

3.2.5.1 Berlin Transport Company

Institutional framework

In conclusion, two examples of the provision of public goods/services are to be mentioned to show that the public sector is not only able to reduce air pollution by exerting an influence on others but also by its own activities. The

Berlin Transport Company (Berliner Verkehrsgemeinschaft - BVG) is a metropolitan transport company providing local public passenger transport. The BVG operates under the legal form of a so-called owner-operated enterprise with the Berlin Senate as the proprietor. This means, for example, that the Berlin Senate implements building projects in the BVG area while the BVG itself is only the user of the respective infrastructure. Every increase in fares is also subject to approval by the Senate.

The BVG is a large-scale company with more than 17 000 employees. The potential contribution it can make towards reducing air pollution is enormous. On the one hand, it can pay attention to "environmentally friendly production", in other words to measures to reduce emission intensity in its transport services. Secondly and most importantly, the company is providing an "environmentally friendly product". Against the background of the extraordinarily high emission intensity caused by personal motor-vehicle transport, every local public transport service has an outstanding ecological advantage. Consequently, the success rate of the BVG in environmental policy is measured primarily by the extent to which it is able to increase the use of local public transport. This indicates how strongly the policy-making functions also influence the ecological potential of public transportation.

The BVG staff division Work Safety/Environment Protection, founded in 1984, is directly responsible for the protection of the environment. Prior to this, a department for environmental protection existed. The division has to implement the statutory environmental protection regulations in the different plants and facilities. It carries out its own measurements, communicates with other specialized divisions and with the Senate, makes proposals for improvements, organizes further training courses and issues a regular report on environmental affairs. How costly internal coordination is within the BVG can be seen by the fact that there are about 70 small enterprises within its framework (workshops, signal stations, etc.).

Reducing the use of solvents in paint shops, testing to reduce emissions produced by diesel-driven vehicles, and introducing fuel-saving plastic chasses which are supposed to be 100% recyclable in the future are some of the results of the above-mentioned activities aimed at controlling air pollution. These measures, however, are related only to the production aspect in the above sense. It is interesting that the interviewees from the environmental protection division do not consider the product aspect as their primary field of activities. This is partly understandable since this is a matter primarily for the management and the competent Senat Department. Nevertheless, free travel for BVG employees and the introduction of the so-called "environment ticket" may be mentioned as positive examples with regard to the product aspect. The "environment-ticket", a monthly ticket transferable to others, has been well received by the general public.

How the staff division is organized

The division is divided into six sections and has a total of 40 employees. Compared to other transport companies, the BVG has institutionalized environmental protection very firmly, according to the main interviewee. More than half of the employees have graduated from institutions of higher education. The designations of the individual sections are: work protection, environmental protection, fire protection, work psychology, workplace ergonomics and internal organization.

In the environmental protection section, different pollution control officers work on the individual media. These are defined within the BVG; they are not prescribed by law.

Nevertheless, they have a comparable function. Four persons deal with air pollution control. If noise pollution is not taken into consideration, the officer for pollution control represents function type IA (see below). Air pollution control forms part of the general environmental protection tasks of the other officers (type IIB). The officer for soil and water protection is mentioned here as an example. Since unification of the BVG and the East Berlin transport companies, the former geology and chemistry teacher's main task lies in detecting previously contaminated land and rehabilitating it.

The head of the division also stands for function type IIB. Aside from his coordinating and managerial tasks, he assumes tasks in the planning of plants and counselling in the event of accidents. He is a qualified mechanical engineer, a safety engineer in the sense of the relevant regulations, and he has completed the recognized courses to become an operational officer for various media and a "fault officer". In the past he was manager of a factory. Needless to say, IIB functions also exist outside the environmental protection division (e.g. head of a paint shop; possibly in the management). We cannot say, and it is doubtful, if there are any (staff) units within the company itself responsible for developing effective air pollution control products (transport concepts).

Head of environmental protection section (5Aa)

The main interviewee has a dual title. His is the head of the environmental protection section and the waste officer. His tasks mainly include waste disposal matters. His activities for air pollution control merge with administrative tasks such as delegating work, issuing instructions, conducting training courses, preparing reports and assessing proposals (function type IIB). He has a lot of freedom to use his own initiative. His job requires basic knowledge of natural sciences and technology, legal knowledge, practical experience, knowledge of electronic data processing, a feel for business and powers of persuasion. Originally he was a chemical laboratory assistant. He worked for a long time in the area of materials testing in the company and has attended many further training courses (skilled worker for work safety, officer for hazardous goods, radiation protection, waste).

Operational officer for pollution control (5Ab)

The second interviewee is the internal pollution control officer already mentioned. His work includes assessment of building projects and participation in the planning of facilities (examining the legal requirements pertaining to the environment); he deals with the procedures necessary for the construction of installations requiring official authorization and sees to the implementation of official regulations or even such things as the current Senate concept "Berlin's air pollution control plan". Apart from these, he deals with some special projects such as asbestos rehabilitation and plant protection at railway track installations.

The interviewee considered the following competences as necessary for his job: knowledge of chemistry in order to evaluate hazardous substances, technical knowledge in order to evaluate the state of technology in existing installations, interdisciplinary knowledge in order to track down problems, practical knowledge and finally social skills in order to communicate with those carrying out the various jobs. The interviewee studied materials sciences and worked in the industrial sector for a long time before starting his job in the environmental protection section of the technology and research division of the BVG. He attended various relevant further training courses.

3.2.5.2 Garbage incineration plant

Institutional framework

A garbage incineration plant in Bavaria is the second example illustrating the function "public companies". This Federal Land presently has over ten incineration plants, the operation of which is monitored by the municipal councils. The relevance of garbage incineration for air pollution control is obvious. Unlike public transport companies, the "function" of garbage incineration plants consists initially of "generating" pollution of the air within the limits of the Federal Emission Protection Law by reducing pollution through garbage. Consequently, the task of air pollution control policy in such plants can only be formulated to the effect of minimizing as far as possible the inherent massive air pollution.

The "Zweckverband Müllverwertungsanlage Ingolstadt" (MVA) (Ingolstadt special-purpose association garbage treatment plant) in our survey is a corporation under public law which fulfils state tasks. It has existed since 1978 and in the meantime has become an amalgamation of five municipalities in the region. At the same time, however, the association must comply with the pertinent environmental regulations just as every other enterprise. The accumulated garbage (e.g. household waste, commercial and industrial waste similar to household waste) is either incinerated or put in a tip according to the relevant waste disposal regulations.

In our opinion, air pollution control measures start to become interesting when it is not just a question of minimizing emissions caused by incineration (e.g. by means of new systems such as flue gas wash), but when the additional potential for reduction is called into play. The MVA has taken two types of measures in this respect; the indirect effect of both relief measures has been to reduce the demand for garbage incineration. The latest furnace is used simultaneously for heat and power generation, with the result that staff can be saved elsewhere. Furthermore, the first local campaigns are being organized to prevent waste and collect it separately according to type from private households. The effectiveness of such campaigns can hardly be checked by the MVA, however. The additional objective of sorting commercial and industrial waste can be monitored more easily (evidence of waste disposal system). Such approaches have resulted in a renaming of the garbage incineration plant. It is now called a garbage treatment plant.

The latter type of measure is beyond the scope of the company's direct influence. Similar to the public transport company's attitude towards such aspects, this is not considered to be an area in which they are involved.

How the relevant sections are organized

The Ingolstadt garbage treatment plant (MVA) has a total of 86 employees. About sixty of these are blue-collar workers and 25 are white-collar workers, of whom very few are in higher-grade jobs. The MVA is organized into a technical and an administrative division. A full-time manager has only been employed for the last 5 years. The technical division is responsible for the technical aspects of pollution control (improved installation technology). There are no special jobs in the field of air pollution control (in contrast to water control). The jobs related to the air are of function type IIB while the potential contribution to air pollution control takes various forms (e.g. minimizing the risk of faults, optimizing the incineration process in normal operation, correct recording of emission development).

The shift foreman is mentioned here as an example. He keeps the shift books, assists in monitoring the installations during breaks, makes inspection rounds and is responsible for reporting faults. His work requires craftsman skills, a willingness to bear responsibility and social skills. He qualified as a master craftsman in a metalworking occupation and also attended a special course to become a boiler operative. The plant electricians are responsible for the maintenance of the electronic controls of the furnaces and for monitoring the measuring instruments. For this job they must have qualified in the relevant training occupation and possess the corresponding craftsman skills. The crane operator could also be mentioned as an example. He is responsible for feeding the furnaces and mixing the garbage thoroughly to facilitate the incineration process. He needed no prior training before starting this job.

Outside the technical division, the new post of an industrial disposal counsellor is worth mentioning. Contrary to a previous agreement, we were unable to interview him in person. He is supposed to advise commercial and industrial enterprises in matters to do with waste disposal. For this purpose he needs special knowledge of waste disposal, commitment and a positive attitude towards environmental protection. The counsellor is a mechanical engineer. He worked in an environmental authority at Land level before starting his present job. This case clearly shows how an institutional political requirement is directly translated into the creation of a relevant occupational profile.

Technical plant manager (5Ba)

The main interviewee is head of the technical division. Responsible for the technical operations of the entire plant, he is directly subordinate to the manager of the business. His tasks consist of managing and monitoring personnel, organizing the technical maintenance and planning new buildings and installations. Policy requirements have a direct influence on his work. External communication with authorities, planning offices and building enterprises plays an important role as well.

He is required to know the entire plant (knowledge of the system), to have an overview of the approaches for reducing emissions, to possess sound engineering knowledge and basic knowledge of natural sciences. He also needs legal knowledge (particularly of limits), managerial qualifications, not to mention a positive attitude towards environmental protection. After completing his degree as a mechanical engineer, the interviewee took part in various technical further training courses relating to environmental protection. He also gained professional experience in a power station.

Measurements Controller (5Bb)

The second interviewee works in the technical division under the shift foreman. His is a job of performing the work as instructed and in this function he is responsible for monitoring the computer-controlled incineration plant. This task includes routine inspection and control of different measuring values and installation functions (e.g. emissions, flue gas temperature, pressures, hydraulic motions). In the event of faults, he has to inform the field service staff who then eliminates them. Furthermore, the field service staff is responsible for the routine servicing of the installations. Apart from controlling the incineration plant, the measurements controller also does field service. Cooperation is mainly limited to the shift team and the technical plant manager.

Competences required for this job are a technical understanding of the installation, the knowledge of limits, craftsman skills and practical experience. The interviewee is a skilled metalworker by trade. Among other things he did in the past was work as a janitor and he attended a relevant course to become a boiler operative.

3.3 Comparative analysis of institutions and occupational profiles

3.3.1 Significance of the findings

The question of how government policy on air pollution control - representing government environmental policy as a whole - is reflected in the public service occupational profiles could only be dealt with here on a narrow empirical basis. However, this does not mean that environmental policy in practice affects only a small number of employees in the public sector. On the contrary, the statements made here may be of importance for a large group of people. A rough projection based on the number of people employed in the Federal and Laender environmental departments which we surveyed here, would mean some 10 000 people are employed in this branch alone. Of these, some 25% might well be working directly on tasks to do with air pollution control. Added to this are all those employed in environmental departments, offices and sections at the municipal level dealing directly with environmental policy. That could easily be several thousand employees as well.

There are also environmental protection and air pollution control tasks which fall outside environmental policy in the strict sense. The division in the Ministry of Social Affairs, Health and Energy provided such an example (1B). Of course, we cannot say how many non-environmental ministries and other authorities at Federal and Laender level exist which are formally or informally engaged in occupational activities that benefit environmental protection. However, we do know of a number of such examples (such as the "ecological economy" section within the Berlin Senate Department for Economy and Technology; or the individuals in several departments of the Federal Institute for Vocational Training.)

This group of people is important just as the administrative section of the factory inspectorates is, which for their part employ several thousand people at least, of whom 50% are dealing with environmental issues. These projections are based on figures from Schleswig-Holstein and North Rhine-Westphalia. According to information given on the phone by a clerk in the Ministry of Environment of North Rhine-Westphalia, this state with the highest population in Germany has 22 factory inspectorates employing over 600 people.

This should suffice as a first assessment of quantitative dimensions. Naturally it has no bearing on the fact that those employed in the public service (from urban transport companies to typing pools), are able to cause or prevent pollution by the way they carry out their job (e.g. saving energy).

The random sample in our survey is very small and not representative. Thus, the findings cannot be generalized regardless of how many persons perform similar types of activities. In the private sector, there does seem to be a greater variety of occupational profiles defined by environmental protection and air pollution tasks than in the public sector. The survey showed that, once the respective governmental function is identified, then a fair amount can be said about the nature of the tasks in that particular position. Seen from this angle, conclusions about occupational profiles can be drawn easily on the basis of information about the institutional framework.

This discovery also means that it was worthwhile to make a distinction from the outset between the functions of policy-making, research, inspection and control, information and public companies. There are more common features between institutions and job holders within one type of function than between cases drawn from different types of function.

Nevertheless, there are also considerable differences within the functions as we have clearly presented in the case studies above. Admittedly, many of these differences result from our selection because differentiating criteria was laid down at the outset. If for example, an informational institution such as the Environmental Counselling division of the Environmental Office in Frankfurt, in contrast to that of the Federal Environmental Agency, organizes local information events, then this is due primarily to the decentralized nature of its organizational structure.

The occupational profiles relating to air pollution control examined in public companies generally do not differ very much from similar profiles in the private sector. In this respect, our survey of the public sector has added scarcely any new information to what was known from the previous survey on the private sector. Administrative knowledge will likely play a greater role since the emphasis is placed on communication within the public service. Some of the interviewees, however, made a point of stating their strong commitment to public well-being. Public companies obviously have a greater need to justify their environmental policy with regard to their economic activities.

3.3.2 Air pollution control within the institutional structure

The realization that the occupational profiles are significantly moulded by the institutional functions to which they belong is not only of methodological interest, it needs to be examined more closely. In this respect, there is a distinct difference from industry where knowledge about the industrial enterprise itself says very little about the scope of the individual occupational profiles. The main reason for this may well be that ascertaining public responsibilities in environmental protection typically finds expression in the creation or obligating of special institutions and departments. It must be possible to check the responsibilities in the public sector far more than in the private sector, where environmentally relevant action is only partly registered by governmental regulations.

Thus, conflicting forms of state action such as loudly proclaimed promotional programmes and sober laws containing inspection and control regulations demand equally explicit competences. This has resulted in an internal division of labour within authorities, which makes the respective public task comprehensible, frequently down as far as the individual occupational profiles. The differences between the individual institutions mentioned under Point 3.3.1 also are an important finding. One and the same task may be subject not only to very different organizational forms, it may also be handled in extremely different ways. For instance, in the Berlin Senate Department of the Environment more than five times as many persons are employed in the field of pollution control than at the corresponding authority in Kiel (160 compared with 28). These discrepancies cannot be explained solely by the differences in the size of the problem.

A major finding from the case studies and of the survey as a whole is that Germany has virtually no independent public institutions dealing specifically with air pollution control. The only exception seems to be the Regional Office for Pollution Control in North Rhine-Westphalia, (which is competent both for air and noise pollution; this difference was disregarded here, however).

Special competence for air pollution control is anchored only below the level of the institution itself. Several examples show that especially in large institutions, it is often anchored on the level just below the main divisions (1A, 2B, 4A). In other cases, this special competence is fixed at an even lower level, or possibly even at the level of an individual post, or it may not warrant mention at all.

The function of research seems the most likely to be predestined for the establishment of special jobs for air pollution control. Even the recording of the increasing number of known air and climate pollutants obviously requires a high degree of specialization.

The random sample showed that in policy-making, there are no institutional sub-divisions specializing in air pollution control. This was of course due to our random sample. The organigrams and political tasks of the Federal Environmental Agency or the Berlin Senate Environmental Department are an indication that they do indeed exist. The area of standardization (see Point 3.1 of the test) may well be of more importance than programme development, however. With regard to policy-making, it is worth mentioning that the trend is more towards an interdisciplinary media policy so an isolated air pollution control policy is a debatable stance in any case.

Within the inspection and control function, responsibility for air pollution control is frequently integrated into existing posts involving general inspection tasks. However, this responsibility is differentiated according to statutory regulations pertaining to pollution control, individual branches and types of installations (see 3B, 3C).

In only one public company did we find special competence for air pollution control at the individual occupational profile level. Finally, in the sub-units of authorities dealing primarily with the provision of information to the public, responsibility is not allocated according to the various environmental media. Persons working there draw on the media-specific expertise of the respective specialized divisions, however. The work of the specialized division which focuses mainly on research is often of direct benefit in educating the public.

The last statement represents another significant finding of the survey: the authorities dealing with environmental protection or air pollution control are typically not mono-functional. At most, the factory inspectorates restrict themselves to inspection and control. Otherwise policy-making, research and information functions in particular often occur together. At times this is also the case within divisions (e.g. 1B). Elements of policy-making can even be seen in the structure of what public companies offer.

A further far-reaching multifunctionality can be identified from the parallelism of governmental functions, i.e. the direct fusion of function types. For instance, when the authority 4B runs public information events these can be used to promote policy in the area of environmental education or for presenting its environmental policy stance. Or research into the state of technology (2B) tends to weave its way via policy counselling into policy-making. Institutions' own research and in particular, promotion of research play an important role within policy-making since this is often the way in which incentives for action are discovered, which policy-makers then use to influence the behaviour of polluters (1A, 1B).

In the final analysis, all state functions are permeated by policy-making. Research ceases to be neutral not only when considering the question of the state of technology or researching effects for establishing limits for what is environmentally acceptable (though this has not been surveyed here). According to some interviewees (e.g. 2Aa) even relatively harmless research on measuring pollutants is highly political since a correspondingly advanced state of research promises international leadership. The decentralized information function of 4B owes its status to the Chernobyl reactor catastrophe. In carrying out its function, the respective division is strongly functionalised time and again for local policy. Attention was also drawn in the relevant individual case studies to the scope for policy-making within inspection and control. Whether they want it or not, public companies function as negative or positive examples for other companies.

It is worth mentioning in passing that governmental action in the field of air pollution control is certainly not restricted to non-governmental enterprises. Higher Land authorities frequently try to control the activities of lower Land authorities (1B, 3A). As mentioned above, research divisions (2Aa, 2Ba) are called on to advise policy-makers. Nevertheless, governmental action is still far from a state of "ecological self-reflection" where every measure is preventively checked for its reciprocal primary and secondary ecological effects.

3.3.3 Contemplation beyond the limits of occupational profiles

3.3.3.1 Occupational functions in air pollution control

All four occupational functions described under Point 3.1 appear in the random sample. A summary classification of all directly and indirectly surveyed occupational profiles can be found in Annex 3. A quick look at the distribution of profiles shows that integrative functions dominate. They comprise positions in environmental protection and other positions set up for other reasons (e.g. crane operator 5B, expert for energy planning and counselling 1B). The large number of these functions is partially due to the fact that air pollution control only became an important official and occupational requirement long after the respective positions had been established.

Normally special competences in air pollution control are established in the form of full-time jobs. In some cases these competences are explicitly expressed in the designation of the function (e.g. head of the specialized field for pollution control (4Ba); operational officer for pollution control (5Ab)). In contrast to private industry, part-time activities rate only secondary importance.

In keeping with what was said on page 75, type IA occupational functions occur with an above-average frequency in the research sector; type IIB functions are distributed mainly among the areas of policy-making, information and public companies.

The type of occupational function sometimes seems to depend on whether or not the state function is specifically intended for air pollution control. For example, within the framework of the public information function, there will hardly be any position specifically intended for dealing with air pollution control unless this function itself provides for a specialization. The same holds true for the policy-making function with a claim to an inter-medial approach (1A). The reverse is true for research.

3.3.3.2 Contemplation of tasks beyond the limits of occupational profiles

Relative importance of individual task areas

The typology of core tasks presented at the beginning of this chapter is the starting point for an overall contemplation of tasks. This typology itself is the result of abstracting from individual cases. The various tasks of the interviewees were not only used for determining types but also for counting the frequency with which tasks were named. On this basis, it is possible to determine the relative weighting of tasks as a whole and according to these, sub-groups of interest. (In the course of our research, matrixes were made showing which tasks were represented for each occupational profile). The following table shows the aggregate frequency of the named tasks (132 tasks named altogether).

Distribution of tasks in the field of air pollution control

1. **Policy-making** **(N=23)**

1.1 Concept, planning, development, decision-making (N=18)

1.2 Establishing ecological standards (N=5)

2. **Gathering subject-related information** **(N=19)**

2.1 Gathering primary data (N=11)

2.2 Processing secondary data (N=8)

3. **Communication** **(N=53)**

3.1 Internal communication (N=23)

3.1.1 Personnel management and organization of personnel (N=9)

3.1.2 Interdepartmental (within the authority) communication (N=14)

3.2 External communication (N=30)

3.2.1 Cooperation in order to fulfil tasks (N=11)

3.2.2 Public relations work (N=2)

3.2.3 Provision of information to the general public (N=5)

3.2.4 Guidance and answering enquiries (specific persons/groups) (N=12)

4. **Administrative examination and implementation** **(N=28)**

4.1 Application of standards to specific situations (N=10)

4.2 Simple administrative work in the narrow sense (N=12)

4.3 Performing other tasks (N=6)

5. Technical and operative implementation (N=7)

5.1 Servicing and maintenance of installations (N=2)

5.2 Inspecting installations (N=2)

5.3 Carrying out protective measures (N=3)

6. Direct inspection and control (N=2)

The chart draws attention to the great importance attached to communication tasks. Even without considering the personnel issues in the individual departments or groups, this area of tasks clearly tops the list. It is also a sign that the staff members do not "stew in their own juice" but cultivate the most varied external contacts. Communication is sometimes so heavily biased because some practical tasks are performed by external authorities (e.g. the Technical Inspection Association performs measurement tasks within the framework of inspection and control duties).

The traditional tasks of authorities, administrative examination and implementation, ranked only second. Policy-making tasks are also relatively prominent whereas setting standards was not mentioned so often.

By and large, the most elementary areas of tasks seemed to be less important than the complex fields of action. This indicates that the activities we investigated are of a high level, which of course is largely due to our choice of main interviewees.

What these tasks only indirectly show, is that the tasks related to air pollution control are only sometimes specifically related to this medium. This applies to the task fields 5 and 6.

Distribution of tasks according to function

Apart from the general quantitative importance of the tasks, it is also of interest to see how they are distributed according to the different governmental functions. Study of the individual cases has already shown that there are tasks which relate to a specific function and those that do not.

The tasks involving technical and operative implementation are specific. They are only included in the random sample because we investigated public companies; nobody working in any other of the institutions performs such types of tasks. The work of such employees is closely linked to specific installations which are only found where something is "produced". (See the Synthesis Report by Nitschke in publication for the type of functions in work linked to installations). For obvious reasons, the tasks of direct control also occur only within the inspection and control function.

The other task areas are scattered throughout the governmental functions. This is least obvious in the task area 4, which clearly has a dual focus: inspection and control, and policy-making. Type 4.2 tasks occur not only in operative activities but also in executive positions.

The sort of task under 1.1 was the most frequently named; it was mentioned by a total of 13 persons (multiple naming of the same sort of task was allowed). It is of note that the tasks of planning, decision-making and development are not relevant to inspection and control (where incidentally there is no setting of standards either). It is not surprising that the measurements controller (5Bb) does not have to perform such tasks, but that is not the case of the head of the section (2Ba); he obviously has a below-average level of policy-making scope - which corresponds with what he considers to be a low degree of autonomy.

The second policy-making task of establishing standards is mentioned much more rarely. Only five persons are active in this field (1Aa: e.g. development of programme criteria; extension of housing construction guidelines; otherwise e.g.: 3Aa, 4Ba, 5Ab).

The focus of the information gathering area clearly lies in research. Understandably this is mainly due to the task of supplying primary data, which is also very specific to air pollution control; outside research, such tasks are only performed by 4Ba and 5Aa, in other words by persons in executive positions. Processing of secondary data is more scattered over the various types of functions.

Naturally, personnel-related communication tasks are performed by all those in executive positions (but also by 1Ab in dealing with people employed under a job-creation programme). The remaining tasks of internal communication are more broadly distributed. Employees performing strictly operative activities are not found here either; their communication seems to be limited to within the division and not worth mentioning.

It is quite understandable that external communication is primarily a matter for those whose work deals with educating the public (even exclusively in the field of tasks under 3.2.3). Answering enquiries, however, can also be a task performed by persons working in inspection and control headquarters and by the researchers with information and counselling duties.

3.3.3.3 Study of competences covering all profiles

The relative importance of the individual types of competences

Similar to the analysis of tasks, the study of competences was based on the typology of the afore-mentioned competences. As the overall distribution of 133 citings indicates, specialized knowledge is the best armour and the soundest basis for fulfilling the duties; it is strongly dominated by the "hard" subjects. Competence in taking action and communication skills comes second. Taken together, interdisciplinary qualification aspects (2., 3.) rank surprisingly high in the minds of the interviewees. In connection with the competence in taking action, they even outstrip specialized knowledge. Comparable to the findings in the study on industry, competences in the narrow sense play a very minor role.

Distribution according to the individual functions

Since it is important in educational work to pass on knowledge in the right form, it is no wonder that specialized knowledge is considered to be less important here than in the other functions. The specialized knowledge of persons working in inspection or "on-site" in public companies is given particular stress. Inspectorate officers emphasize in particular technical knowledge related to installations. Among executive personnel, specialized knowledge plays a relatively minor role; it seems to be of less importance there than in comparable positions in the industrial sector. In simple, operative activities specialized knowledge is also of minor importance.

Interdisciplinary qualifications were named mostly by employees performing information tasks. It is not a coincidence that "soft" subjects such as psychology and interdisciplinary qualifications are considered to be important mainly by those who most likely use "soft" means to influence behaviour (education, policy-making as different from inspection and control which uses the instrument of regulations).

Distribution of the required competences in the field of air pollution control

1.	**Specialized knowledge**	**(N=43)**
1.1	Knowledge of legislation and administration (N=11)	
1.2	Technical knowledge (N=14)	
1.3	Knowledge of natural sciences (N=12)	
1.4	Knowledge of social sciences (N=2)	
1.5	Knowledge of economics (N=4)	
2.	**Interdisciplinary knowledge**	**(N=18)**
2.1	Thinking beyond the limits of one's own occupation (N=7)	
2.2	Ability to orientate oneself (N=11)	
3.	**Knowledge based on experience**	**(N=22)**
4.	**Competence in taking action and communication skills**	**(N=27)**
4.1	Ability to convince people (N=10)	
4.2	Cooperation and communication skills (N=8)	

4.3 Assertiveness (N=9)

5. **Motivation, attitude, awareness (N=11)**

5.1 Environmental protection attitudes (N=9)

5.2 Positive attitude towards "serving the state" (N=2)

6. **Competences in the narrow sense (N=11)**

Correspondingly, competence in taking action and communication skills were mentioned exceptionally frequently. In this connection it is worth mentioning that we were most impressed by the relaxed tone and frankness of the majority of the interviewees. This willingness to communicate is a rather rare trait in authorities, - in our opinion, it is strongly connected to the subject of environmental protection. It was especially noticeable among those who often have to deal with the public in conjunction with their tasks.

Those working in policy-making stressed their reliance on knowledge based on experience as a further resource for influencing behaviour. In research, however, it was mentioned the least.

It is conspicuous that attitudes towards environmental protection are an important factor almost throughout policy-making (otherwise only in 3A and 5Ba). This was articulated all the more strongly, the more "non-conformist" the interviewees seemed to be. Informal talks on the side revealed that "attitude" frequently went hand in hand with political affiliation. Some expert positions and all positions from head of the department upwards are classified by heads of the ministries as political functions.

Competences in the narrow sense, which are mainly required by those in executive functions, are not so crucial. Just as in some other positions, there are parallels to be made here with the findings in industry (see Nitschke/Schumann, 1990, p. 33 ff.). One of the main differences between employees in the public service and their colleagues in the private sector is that competences that lead to reaching the public widescale are of more importance (e.g. ability to establish international contacts, foreign languages, publication). Of course "political qualification" is sometimes specific to the public service. In the end, party membership and similar insignia have the same function as affiliation to the company. They both serve to indicate loyalty towards the employer (loc.cit., p.38).

3.3.3.4 Functions according to main tasks and competences

The following summary is basically a complementary view to the two previous sections. There we analyzed the tasks and competences regardless of what function was involved. Here we intend to name the main tasks and the competences required most within each type of governmental function.

In the policy-making function, the main tasks understandably consist of conceiving and developing (mainly programmes) but also include administrative control and implementation as well as internal communication. It is interesting to note that the positions surveyed in institution 1A seem to have a broader task profile than those in 1B. All the observed activities represent function type IIB.

With regard to the necessary competences, it is noticeable that the relevant activities require first and foremost knowledge based on experience as well as competence in taking action and communication skills. Policy-makers will obviously have no chance of developing an effective policy unless they do have background knowledge on the situation and circumstances of those whom they are supposed to be motivating to take air pollution control measures and unless they are able to establish exploratory contacts and analyze situations.

A comparison of the profiles of various governmental functions shows that policy-makers must have the broadest spectrum of competences. This can easily be explained by the above-average level of flexibility required, which stems from the fact that the priorities of the political powers that be are often directly transformed there into new (and sometimes rapidly changing) tasks.

Naturally the main task of researchers is to gather primary data. Concepts are also of above-average importance. Nevertheless, all those performing subject-matter related work can be classified under function type IA while staff assisting with administrative or technical work represent function type IB. In accordance with their main task of creating new information, it is most important for researchers to be specialized in a relevant branch of natural sciences or have the relevant technical knowledge. Communication skills also play a vital role, however. This is probably due to the fact that researchers engage in an intensive exchange of information with colleagues from other institutions and are active as consultants to policy-makers.

As might be expected, when performing governmental inspection and control functions, tasks in the field of administrative examination and implementation have priority. External communication is likewise extremely important for maintaining active contact with polluters and coordinating with other inspection authorities. These activities are categorized as function types IA and IIA. The specialized competences, regardless of whether they are organized on a full-time or part-time basis, are in part created by the subdivisions in the authorities whose work is orientated towards pollution control legislation. For inspectors and controllers specialized knowledge ranks highest in importance while technical and legal knowledge tie for second place.

Within the function of providing information to the public, it is plausible that external communication tasks dominate, especially communication that has not been initiated in the institution itself but is a response to an external enquiry for information. Other priorities are concepts for information strategies and communication within the division. The surveyed jobs can be classified under the various types of functions.

Competence in taking action and communication skills as well as interdisciplinary thinking are the most important competences required. To a certain extent, providers of information have the most generalized occupational profiles.

The tasks of the representatives of the public companies are relatively equally distributed over all functions, apart from direct inspection in the sense of the typology of course. If external communication is of slightly less importance than elsewhere, then it might be because public companies are, in the final analysis, less "public" than all the other governmental function types in our survey. The investigated profiles belong to the function types IA and IIB. Since the companies have to ensure air pollution control directly, then it follows that the competences most needed are specialized (technical) knowledge and knowledge based on experience.

In summary, it can be said that the directly surveyed occupational profiles are shaped by and large by the functions they serve.

3.3.3.5 Note on the complexity of occupational profiles

Counting how often a task (and also a specific competence) occurs allows us in principle to define two (only very approximate) indicators of the complexity of the profiles, namely how often it is mentioned and the number of areas it may be assigned to. The number of times a task is mentioned and its diversity correlates fairly well with the number of times a competence is mentioned and its diversity.

The meaningfulness of the indicators is limited because they still do not contain any assessment of the complexity of each individual task; this problem cannot be pursued any further here.

If the context reveals that many tasks occur mostly in connection with research and provision of information, it is worth bearing in mind, in view of the low number of interviews, that this might easily result from the complexity of the individual occupational profiles. The random sample produced the following "leaders":

1. 5Aa: 11 tasks from 5 areas;
2. 2Aa: 12 tasks from 4 areas;
3. 4Ba: 11 tasks from 4 areas.

The persons in question also rank among the leaders with regard to the competences they require. All of them perform executive functions and are highly involved in policy-making tasks. The only person who does not have a supervising position but has a broad range of tasks is 1Ab mentioned above. She also has a very broad qualification profile.

Although the random sample did not reveal any employees with all-round competence profiles, four persons named five areas of competence (1Ab, 1Bb, 3Ba, 5Ba).

The other side of the coin tells a different story. Counting backwards we have:

1. 5Bb: 4 tasks from 2 areas;
2. 3Ab: 5 tasks from 2 areas;
3. 1Bb: 4 tasks from 3 areas.

With the exception of 1Bb, they belong to the group with the narrowest qualification profiles. All of them were secondary interviewees in lower positions from the formal point of view.

Perhaps it is no coincidence that the two clerks with the narrowest competence profiles work in positions which afford them relatively little contact with the public. According to their own statements, they do not need competence in taking action or communication skills, and this is the main reason for their narrow profiles.

For reasons of space, we cannot go into further detail here. We would only like to point out that deviations from the basic pattern also occur. There are for example relatively narrow task profiles among the main interviewees (e.g. 1Ba) and positions with a broad spectrum of competences and narrower task profiles (e.g. 5Ba). The narrow area of tasks of 1Ba might be connected to the fact that the Land has relatively little legal authority and few possibilities for enforcing energy policy.

3.3.3.6 Personal requirements for fulfilling the tasks

A gap between tasks and competences

The remarks on the complexity of occupational profiles signal a certain consistency between tasks and the competence considered to be necessary. When comparing the overall tasks and competences mentioned, a certain disparity becomes apparent. Of the 132 tasks mentioned, 53 concern the area of communication while only 27 of the 133 competences mentioned are competence in taking action and communication skills. This may be interpreted to mean that the positions require far more communication skills than the interviewees notice or consider important. We may assume that there is a "structural deficit" when it comes to communicative competences (for more details on the industrial sector see loc. cit., p. 33 ff.).

One might object that the interviewees do in fact possess the required competences but did not mention them specifically. We consider such an objection to be unsubstantiated. We gained the impression that the interviewees named the required competences as a means of saying that they actually possess these competences themselves.

This is, however, a moot question: Do the persons carrying out these functions really possess the personal requirements they said they needed to fulfil their tasks?

Deficiencies in continuing training for air pollution control

Seen as a whole and without it being mentioned in detail in the individual case studies, the employees carrying out these functions undertake little continuing training in specific environmental protection matters. This was also found to be the case in the occupational profiles in industry. Positive exceptions are in particular 5Aa and 5Ba (otherwise see annex 6). The further training courses that were attended are marked by the following characteristics: short duration, emphasis on legal or technical aspects, no environmental educational orientation, established providers/sponsors. Neither communication skills nor the required interdisciplinary qualifications can be acquired in this way. Presumably, the same applies to specialized private study, which seems to play a greater role here than in industry.

An exception is the continuing training of the interviewee 4Bb to become an environmental counsellor. According to our information, this training course lasts for one year and has a very demanding learning concept. These specific additional qualifications were also the reason why he was employed in this position with a counselling function. Obvious entry requirements had to be met only by the measurements controller (5Bb) otherwise. He had had to attend a training course to become a boiler operative before obtaining his position.

Useful professional/occupational experience

Relevant professional/occupational experience is a highly accepted qualification in place of special further training measures. Many of the interviewees had been employed in industry before commencing their current jobs. Often the employer welcomes or even requires that new recruits have gained practical experience "in the other camp". Quite a few of the directly and indirectly surveyed persons had even been employed in functions directly related to environmental protection. For example: environmentally relevant research (1Aa, 1Ba, 2Aa, head of section 2A); environmental protection in relevant authorities (3Aa, industrial disposal counsellor); energy companies (expert for energy inspection 1A).

The essential difference in comparison to industry is that recruitment for positions is normally not tied to working one's way up the career ladder within the authority itself.

If one is career-minded in a centralized authority such as a ministry, it appears to be useful to have gained experience working in a decentralized agency with similar tasks (1B, 2B, 3A).

The holders of these positions have gained the knowledge and experience they regard as so important (see point 3.3.3.4) through all these different kinds of professional and occupational experience. Especially in the case of the representative of the public company (5Aa) does the relevant occupational experience seem to have been the decisive factor in his obtaining his present position without having the academic title normally required.

Related training courses

In more than ten of the altogether 47 profiles, the courses of studies correspond relatively well to the functions being performed today. One example is the landscape planner who is responsible for the environmental promotion programme. All the meteorologists now working in the field of pollutant measurement can be included in this group. Engineering degrees seem to be in demand when it comes to work in inspection and approval authorities. One expert for energy planning (1Ba) had studied urban and regional planning; another expert for renewable sources of energy (1B) is a trained civil engineer.

Only very few of the interviewees were trained environmental protection specialists. The following had completed relevant initial training courses: the deputy head of the department (1Aa) has a degree in environmental technology; the head of the measurement network (2Aa) wrote his doctorate on summer smog; two clerks in the factory inspectorate (3B) are environmental technicians and/or completed postgraduate courses in environmental protection; and finally the environmental counsellor (4B) had studied environmental information and counselling.

High formal education qualifications

A final important finding of the survey is that with the exception of the public companies, air pollution control duties in the public service sector, unlike in industry, are performed almost exclusively by highly qualified persons, in other words primarily by persons with higher education qualifications. Fifteen of the 18 main interviewees have completed higher education. 1Ab is the only one in the group who is formally overqualified. We could put forward the theory that this is due to the fact that the public service sector is only indirectly concerned with the problem of air pollution control; it does not work at the source or even "hands on". The simple jobs in the public service normally have nothing to do with air pollution control, they are only there to maintain the necessary infrastructure (drivers, secretaries; i.e. function type IB).

In some cases it is strictly a matter of administrative provisions that only university graduates may hold a certain position.

The personnel in inspection and control authorities, whose tasks involve working relatively close to the sources of pollution, mostly have intermediate school qualifications. Otherwise, it is striking how highly qualified even administrative clerks in the authorities are (university/higher education qualifications). The inspectors in inspection and control have generally studied process or chemical engineering.

Twelve of the 15 higher education graduates completed their studies in natural sciences or technology. The way these courses are organized even today gives no guarantee that they learnt interdisciplinary thinking, which many interviewees considered important for their present work. This would mean that there are most probably gaps in this area between available competences and requirements as is likely the case in competence in taking action and communication skills as well.

Only one person in the survey (employed in authority 4B) seems to have completed strictly administrative training.

Worthy of incidental mention is the fact that the percentage of women holding positions in environmental protection in the public service is higher than in the private sector.

3.3.4 Basic conditions determining occupational behaviour

In conclusion, we would like to outline the factors which influence the results of the interviewees' occupational behaviour. These must be differentiated according to two aspects: the determinants of the tasks and the factors of interest that influence the degree and the way in which the tasks are fulfilled.

Determinants of the tasks

Some statements on the determinants of the tasks have already been mentioned in the argumentation of the previous sections. Looking at them as a whole, four determinants can be identified:

1. Affiliation to the institution and its function
2. The internal organizational structure
3. The external framework conditions
4. The personality of the person carrying out the function.

The size and infrastructural position of the authority (centralized or decentralized) are only two examples of how the institution asserts itself in defining its tasks. The influence of the function and its "proximity to the problem" have been demonstrated by the unequal distribution of tasks among the five surveyed functions. This influence is modified by the respective organizational structures. There is no one correct division of labour to differentiate tasks in the area of air pollution control. Set group structures are just as likely to occur as individual work or project-related team work. The degree of communication among departments also bears an influence on the division of labour within them.

The described determinants in the first category can only be effective within a given framework. This is defined by existing laws in particular (ranging from administrative regulations to executive separation of powers to environmental legislation); at times legislation on pollution control can be directly translated into occupational tasks.

Variable stipulations resulting from the assertion of interests act as another external factor. There is a wide range of variants. The stipulations may be expressed as a requirement to submit comments on the plans of other authorities or as a politicized "supply of what is demanded" in the interests of the highest political echelons. Another variant is the interest of the general public. Here the obligation in small things, responding to enquiries or complaints faces the greater ones of the responsibility towards society to take initiatives in line with recognized ecological priorities (e.g. initiative to prohibit CHC in the case of 1A). Finally, private-sector interests must be mentioned which structure the work of the factory inspectorates. In all these instances the interviewees have to react to matters submitted to them.

Which private or even public interests are expressed depends partly on regional factors, the last link in the chain of external factors. For instance, the regional economic structure of the Itzehoe region imposes specific inspection tasks on the employees of the regional factory inspectorate there. Or after unification, the institutions investigated in Berlin had to assume new tasks in the surrounding area and had to assign certain members of their staff to these.

In the end, the tasks of a given position do not depend on objective conditions alone but also on the person holding the position, his/her formal qualifications, occupational experience and personal characteristics. For instance, the demanding task profile of 1Ab depends on both the non-rigid organizational structure in the department and the willingness and ability of this woman to take on such tasks.

Determinants of fulfilling the tasks

Internal organizational structure and political stipulations have a dual character in as far as they do not only influence the definition of tasks but also the possibilities of fulfilling them. How well and completely the existing tasks are performed depends on a number of other factors as well.

Some interviewees mentioned the tight financial budget. In addition, inadequate (personnel) capacity is crucial since it reflects a structural deficiency. Bottlenecks in capacity are sometimes reflected in a shortage of personnel. For instance, in the specialized group of 4Ba three of six planned positions are not filled. Or in 3B, seven of 50 inspector positions are not filled. Bottlenecks due to personnel shortage are more often registered as insufficient time to perform one's own duties. Half of the interviewees expressed this.

As one of two other factors, we also investigated autonomy in fulfilling one's tasks. Assuming that autonomy has a positive effect on identification with the work (see Nitschke, 1988 on relevant findings), then autonomy can likewise have a positive influence on work results. This connection can be confirmed in some of the cases in the random survey.

However, autonomy also proves to be a largely dependent factor. The position in the hierarchy is most important. The tendency applies: the higher the position, the more freedom there is in carrying out duties. Moreover, statutory stipulations are seen as a fundamental limitation - unless the laws and regulations contain so-called "vague legal terms" such as "a reasonable degree" which provides for certain discretionary powers. What is more, autonomy varies depending on the kind of public function. Seen relatively, in inspection, where the primary concern is the implementation of laws, autonomy is the lowest while in policy-making it is the highest. Finally, the behaviour of superiors likewise effects the sense of freedom.

To a certain extent, autonomy is, in fact, a question of perception. For example, the state of technology is considered a set factor in one case (3B), in another case as a parameter for taking action (1A). Or the above-mentioned interviewee 1Ab experiences such a high degree of autonomy in her work because she uses all the scope she has for taking action and has created space to exercise her autonomy.

Cooperation structures should be mentioned as a final factor. Unlike the findings in the industrial study, a low number of communication relationships does not seem to be an obvious hindrance to carrying out one's tasks. Seen overall, cooperative relationships are very pronounced (named 51 times). The public sector seems to be more open to communication. The Environmental Office with its decentralized information function tops the list although a certain imbalance of cooperative relationships can be observed. While cooperation from authority to authority is mentioned 20 times, cooperation with private environmental protection organizations were named only twice. This clearly shows that there are still considerable deficiencies regarding openness for various environmental-policy agents and deficiencies in networked action.

This concludes our cursory discussion on framework conditions. One last aspect of the evaluation, namely the change in requirements over time, will be dealt with in the final chapter. First we would like to present an overview of what is being offered for the public service occupational profiles in the field of environmental protection.

4. Vocational environmental training for the public service

The vocational qualifications of public service employees in general and of those in our random survey were gained in all areas of education. Only a (small) number of the employees completed training courses preparing them specifically for their work in the civil service (e.g. civil-service-candidate training at an institute of higher education for civil servants). Others receive the necessary administrative knowledge in the form of in-service civil service training for graduates or preparatory service following their normal training. Some others enter the public service without any special additional qualifications.

Bearing this in mind, the following section concerns the opportunities offered to (future) public service employees for training in the fields of environmental protection and air pollution control. A few alternatives have already been mentioned in the descriptions in the individual case studies. We would now like to take a closer look at the training courses which were identified within the framework of the case studies. We would then like to add a general survey of what is being offered for occupational profiles in the field of environmental protection. The study on the private sector also provided such a list. As in the study on industry, a differentiation has been made between two types of environmental education: independent and integrated education. Similar to the distinction made between the types of occupational functions, the independent sort is characterized by the fact that the environmentally-related subject-matter can be formally distinguished from the other vocational qualifications; in the extreme case this distinction can lead to a special job outline. In contrast to this, integrated education occurs within an existing occupation or training course. The two variants can occur both in initial training and continuing training.

With regard to the special subject of air pollution control, it will in most cases be dealt with within the framework of environmental subjects. Special training courses on air pollution control are the exception rather than the rule except for highly specialized events of short duration.

4.1 The contribution of the surveyed institutions to vocational environmental training

Qualifying employees for air pollution control tasks does not play an important role in the surveyed institutions. Consequently, the majority of the interviewees who assessed this matter criticized this. The basic conditions under which such qualification measures could be held differ greatly. Even though there might be some attempts to provide environmental training such as the Federal Environmental Agency's aim to provide further training to every staff member once a year, and the factory inspectorate (3B) allowing up to 1.5% of working hours for further training, only very limited measures are possible. On the other hand, employees in the Federal Environmental Agency have a legally guaranteed right to five days further training per year which would offer a relatively broad scope for environmental training. We cannot say to what extent such regulations exist in other institutions but we know that some of the Federal Laender have legislation on educational leave. There is no obligation to grant educational leave in general or specifically for environmental education.

Three of the institutions surveyed have special positions for further training. While the municipal council of Frankfurt/Main (4B) has a further training office, the Berlin

Senate Department for Urban Development and the Environment and the Federal Environmental Agency have set up positions for further training officers. It seems, however, that those holding the positions have not concerned themselves with environmental training so far. This potential has yet to be tapped.

If governmental agencies provide in-house further training, they mainly cover the subject of administration. Only in three cases were events organized in the field of environmental protection (1A, 2A/4A, 5A). In spite of this, several institutions run events for external participants (e.g. 2B, 4B). At least in the case of 4B, there is a regular, self-organized exchange of experience which would likely be conducive to further training qualifications.

The public transport company (5A) is the only institution that has developed a systematic further training concept in environmental protection. The work psychology section in the work safety and environmental protection division is responsible for that. The various events and basic and continuing training courses are aimed at different target groups such as senior executives, designers, procurers or drivers of hazardous goods. They last three days as a rule. There are also long-term measures which are organized by external providers. Attendance at such courses are a great asset for promotion.

The main interviewee in the factory inspectorate (3Ba) informed us that the examination regulations for the preparatory service for a civil-service career in the upper echelons foresees pollution control training within the framework of the theoretical section. In this special instance of training, environmental protection takes on an obligatory nature.

The internal restraint of the authorities in environmental training is not compensated by systematic promotion of attendance at external events. The employees have to make arrangements themselves, meaning that only very few persons make use of this possibility, as mentioned in point 3.3.3.6. Besides, attendance is sometimes hindered by the limited budget for external cost-intensive further training (explicitly mentioned in 3A, 4B). We know from other interviews with providers of continuing training in the field of environmental protection that this is often the reason why employees do not attend these events. It would be difficult to implement the above-mentioned legal right to further training even if legal action were taken. Some of the interviewees were very sceptical about the motivation behind their colleagues undergoing continuing training.

4.2 Other qualification possibilities in the Federal Republic of Germany

4.2.1 Environmental protection as independent vocational training

4.2.1.1 Initial training

In the whole area of education, there is not one single training course dedicated to environmental protection in the public service. The occupation of the water supply and waste disposal officer, described in the study on the metalworking and chemical industries is, however, a training occupation which is highly relevant to public service. According to the figures provided by the relatively current study on industry, up until recently 90% of the trained water supply and waste disposal officers found employment in the public service, particularly in municipal enterprises (for more detail see Nitschke/Schumann, 1990, p. 12 f.).

This occupation is the only "environmental protection occupation" so far within the dual system of training which is carried out in an enterprise and at a vocational school. It has a strong technical orientation. Training is provided in three subject areas: water supply, waste water and waste disposal. The third subject area seems most likely to be related to air pollution control although the different types of general subject-matter treated in the course, such as the efficient use of energy, carrying out measurements and microbiological work, benefit all environmental media.

Many of those who have completed a so-called "assistant" occupation (relevant to environmental protection) in a full-time training course look for employment in the public service sector. Statistics are not available, however. Examples of such training courses are those leading to qualifications as a technical environmental assistant or the technical assistant for environmental protection which exist in some of the Federal Laender (for a survey see BA, 1990, p. 50 f.).

In view of the fact that jobs in air pollution control are mainly filled by higher education graduates, it is important to know what is happening at universities in faculties to do with environmental education. The "Studienführer Umweltschutz" (University Guide to Environmental Protection) (see UBA, 1988) provides information on this. The 1988 edition lists 97 courses and 18 post-graduate courses at universities which have (an integrated or independent) relevance to environmental protection; the corresponding figures for other higher-education institutions are 73 and three. The university guide does not list any courses at specialized administrative institutions of higher education, however.

Two independent courses in environmental protection are listed: Technical Environmental Protection at the Berlin University of Technology (from which interviewee 1Aa graduated) and Environmental Protection at the Fachhochschule (Institute of Higher Education) in Bingen. Air pollution control is, of course, on the curriculum and may be chosen as an in-depth elective at the Berlin University. Administrative law and environmental economics are also among the subjects dealt with. About 60% of the graduates from institutes of higher education are said to go into the public service (see UBA, 1988, p. 572).

There are also several specialized post-graduate courses in environmental protection; they are a cross between initial training and continuing training, and are normally technically oriented. An exception is the post-graduate course "Environmental Education and Conservation Management" at the Pädagogische Hochschule (Teacher Training University) in Ludwigsburg. It is a contact course of studies for teachers and student teachers but also for administrative clerks and civil servants; in other words it has an obvious relation to the public service.

In the context of a project for CEDEFOP, the four-semester post-graduate course "European Diploma in Environmental Sciences" should be mentioned as a special case. The subjects include planning and social sciences and are taught at various universities in Germany, France, Belgium and Luxembourg. The German universities involved are in Trier, Saarbrücken and Kaiserslautern. Only 20 students are admitted per year. They must have completed scientific studies at an institution of higher education and must be fluent in French. After completing this four-semester post-graduate course they may be employed at European and national agencies involved with urban, regional and state planning or in conservation and environmental protection.

The University of Bielefeld offers an even more interdisciplinary orientated post-graduate course, "Continuing Training Studies in Environmental Counselling". It likewise takes four semesters and completed studies is an entry requirement (see UBA, 1988, p. 50 f.).

4.2.1.2 Continuing training

The above-mentioned continuing training studies are only one way of acquiring qualifications for the field of environmental counselling and similar tasks. Quantitatively more important are continuing training measures in the narrow sense which are sponsored by the manpower offices and are aimed at higher-education graduates threatened by unemployment. Apart from explicit environmental counsellor courses, there are also courses to become a "skilled environmental protection worker". The latter one-year course has been offered for years by the Gesellschaft für Weiterbildung und

Umweltschutz (Society for Continuing Training and Environmental Protection) in Burgdorf and Bonn. It likewise has an interdisciplinary orientation. According to a former course participant, 60% of the graduates who find employment are recruited by municipal administrations, 18% by associations, 12% by institutions of higher education and 10% by Land and other administrations.

Short continuing training course of the type mainly mentioned by the interviewees to back up practical work at the job are far more frequent than long-term measures. In our opinion the Institut für kommunale Wirtschaft und Umweltplanung (Institute of Municipal Economy and Environmental Planning) (IKU) in Darmstadt merits special mention because it is unique in that it offers courses specifically for the public service sector. The IKU is a joint institution of the Hesse establishments of higher education. Its courses are run explicitly for executives and staff members of specialized municipal administrations, municipal enterprises and municipal politicians. Many of the organized and planned events lasting one to two days touch indirectly on air pollution control issues. The following subjects can be seen as examples: The construction code as a basis for testing the environmental impact in developmental planning; energy legislation, traffic planning, biogas technology and solar technology.

Another institution with a similar concept is the Land-sponsored Umweltakademie (Environmental Academy) of Schleswig-Holstein which is now under construction. Its target groups also include administrative staff, those working on a honorary basis and municipal politicians.

While the last two institutions mentioned here provide special environmental events for the public service sector, some traditional educational institutions also offer environmental training for the civil service. One example is the Verwaltungsfachhochschule (Institute of Administration) in Altenholz near Kiel. Two of the 25 further training seminars held in 1991, which were open to all members of the workforce dealt with the subject of environmental protection. They were entitled "Introduction to Conservation and Environmental Protection" and "Environmentally-friendly Management of Authorities" (see Verwaltungsfachhochschule Altenholz, 1991, p. 20, 30). In contrast, the further training provided by the well-known Hochschule für Verwaltungswissenschaften (University of Administrative Sciences) in Speyer is aimed exclusively at senior civil servants, but does not include special environmental subjects (see Hochschule, 1991 a).

The vast majority of all environmentally-related further training events is offered by private providers irrespective of the economic sectors of the participants. They deal mainly with environmental technology and environmental legislation. Well-known providers of such environmentally-related further training are: Haus der Technik (House of Technology) in Essen, the nation-wide Verein Deutscher Ingenieure (Association of German Engineers) (VDI), the Technische Überwachungsverein (Technical Inspection Association) (TÜV), the Zentrum für Energie-, Wasser und Umwelttechnik (Energy, Water and Environmental Technology Centre) in Hamburg (ZEWU) as well as the chambers of industry and commerce. Normally members of the public service sector are in the minority at these.

Subjects specifically related to air pollution control are most likely to be covered in these highly-specialized courses. For example, the House of Technology offered two seminars during the third trimester of 1991 within its environmental protection programme: "Operational Measurement Techniques in the Service of Air Pollution Control" and "Implementing the Technical Instructions for Air Pollution Control" (see IMIS, 1991, p. 23). The cost of a two-day seminar may be about DM 1 000.-. This shows just how difficult it is for those employed by the state agencies (or even in small enterprises) to attend such courses.

4.2.2 Environmental protection as integrated vocational training

Integrated environmental training is a term used to indicate that environmental protection subjects are taken into account in traditional training courses. According to the "integration principle", environmental protection aspects have been included in many "recognized training occupations"; thus, treatment of them is obligatory. Although relatively speaking, most of the workforce work in a training occupation, these regulations are only of secondary importance for the public service because too few people with a training occupation work there.

In other training courses, integration of environmental protection is, if it occurs at all, in the form of courses focusing or specializing on related aspects. (Intensive) involvement in environmental protection is then more likely to be on a voluntary basis depending on personal interest. This integration exists at different levels of the educational system. At the university level, the relevant study courses are listed in the previously mentioned University Guide to Environmental Protection. With regard to the public service as a field of employment, examples we can cite here are "Supply Technology - Specializing in Municipal and Environmental Technology" at the Fachhochschule (Institute of Higher Education) in Cologne and the specialized course in environmental legislation within the legal sciences faculty at the University of Bremen. The contents of the latter course include instruments of environmental legislation, process- and product-related substantive legislation and sociological and economic aspects of environmental legislation. The law department is also engaged in environmental research.

Of course it is not known how many graduates of "integrated" studies work for the public service. Any integration of environmental protection in training courses aimed specifically at the public service would in contrast allow far more direct conclusions to be made about the state of affairs among the employed. Here we can only provide some selective information.

In Berlin, for example, a two-year course at an administrative school has to be completed in order to become a medium-level civil servant. These courses are only for the non-technical administration service, however. According to Frau Konrad from the Public Service, Transport and Traffic Trade Union in Berlin (telephone interview on 25 July 1991) these administration schools do not deal with subjects specifically related to the environment.

In each of the "old" Federal Laender there is an institute of higher education for administration which trains for the high-grade civil service. Two of them are mentioned as environmentally-relevant in the University Guide to Environmental Protection. The first institution is the Fachhochschule für öffentliche Verwaltung (Institute of Public Administration) in Gelsenkirchen which enrols between 1 400 and 1 660 students per year. The compulsory optional subject, environmental legislation, is the only link to environmental protection. It is a 64-hour course, which is about 3% of the total course time. The Regional Pollution Control Law is given a lot of attention in relation to air pollution control (Leiter, 1990, p. 248). The situation is similar at the Bayerische Beamtenfachhochschule (Bavarian Civil Servants Institute) in Hof which likewise provides training for the high-grade, non-technical civil service (environmental legislation: 95 hours; see Bayerische Beamtenfachhochschule, 1990, p. 7 f.).

The Fachhochschule für öffentliche Verwaltung (Institute of Public Administration) in Hamburg, which was also mentioned by Jaedicke et al. (1990, p. 105), stands out somewhat with its offer of the (compulsory) optional subject, environmental sociology (72 hours). The introduction includes topics such as the meanings of the term, environment, environmental research, forms and causes of environmental problems and changing attitudes towards the environment. The next stage deals with the effects of the environment on social behaviour. Some inspiration for interdisciplinary thinking, which many interviewees considered important, could be drawn from this.

The Institute of Administrative Sciences in Speyer mentioned above deals with environmental protection to some extent. It is firmly incorporated in a one-semester supplementary course and in a two-semester post-graduate administration course, and in fact e.g. in a project section on "Site supervision planning and environmental protection" and "Case studies from the fields of pollution control and disposal of conventional/nuclear waste" (see Hochschule, 1991 b, p. 32 f.). At present, the research programme of the institute does not take in any projects with specific environmental contents. A possible project some time in the future within "Law and Justice" is a "Planning game on selected process regulations from legislation on the assessment of environmental impact" (see Hochschule, 1991, c, p. 115).

In summary it can be said that the administration institutes scarcely deal with the subject of environmental protection or, with the exception of the institution in Hamburg, only with the area of environmental law. Apart from the institutions already mentioned, some Laender have specialized higher-education establishments for the police which provide training for higher-grade service. At the Fachhochschule der Polizei (Police Institute) in Villingen-Schwenningen and the Fachhochschule für Öffentliche Verwaltung - Fachbereich Polizei (Institute of Public Administration - Faculty of the Police) in Hamburg, environmentally-related subject-matter is an integral part of relevant courses. In both cases, specialization in environmental protection is not possible, however (see UBA, 1988, p. 652 f.).

This may suffice as an overview of the significance of environmental protection in different training courses. We cannot say how many of those who are now employed in the public service make or have made use of the offers described. Since many aspects of environmental protection are relatively new in initial training, it is likely that only those students who have studied in very recent years will have benefited from such courses. In any case, it is indicative that apart from short-term continuing training with a technical environmental orientation or an emphasis on statutory environmental regulations, the various types of occupational environmental training we have described here still play a negligible role in the directly and indirectly surveyed occupational profiles.

4.3 Digression: Teaching and learning aids

Occupational environmental training is not only an issue of institutions and training courses but also of learning aids. In Germany, the first such materials have now been prepared to assist public service employees. They have been published by the Federal Environmental Agency.

One example is a paper entitled "Environmentally-related further and continuing training for municipal politicians and administrative staff" (see UBA, 1986). These learning aids on five subject areas are the result of a pilot project lasting several years in which the documentation was also tested in further training seminars. The seminars experimented with new forms of learning (e.g. project-oriented case studies, excursions, planning games). The lasting value of this pilot project is not simply that it provided information especially tailored to certain target groups but mainly that it developed a whole further training concept. Unlike traditional textbooks, the curriculum is more like instructions on how to activate target groups. In this respect the publication is aimed at multipliers in particular. Air pollution control is dealt with in rather general terms.

The second example is several volumes of course material for the police (see UBA, 1990). The introduction says: "The aids are aimed at police instructors who teach continuing and further training daily. They should provide them with basic information on ecological problems and tips for planning and holding initial and further training courses". The subject area of air pollution control is dealt with in detail mainly under the heading "Air - nothing more than air?". It focuses on the importance of the air for man and society, air pollution, the effects of pollutants, concentration limits, atmospheric retention period, air pollutants and complex problem areas.

The first three volumes contain basic information without any direct reference to the police while the fourth volume establishes a link between the basic knowledge and police work with subjects such as "Gathering evidence - criminal opportunities and limits" and "Securing evidence".

We cannot give any data on how many people have already worked with this material or how many of those in positions of responsibility are aware that such material exists. Even the Federal Environmental Agency has no relevant information on the matter. Nevertheless we believe the first three volumes are well-suited for broad use.

5. Future prospects and development options

5.1 Comparison of environmental occupational profiles in the public service sector

In contrast to those working in the private sector, the environmental-related activities of public servants are not primarily directed towards their own behaviour, but rather towards that of others in order to induce them to take environmental problems more into consideration. The principal target group is companies, but private households and other public institutions as well. This means the work that public servants carry out in the interests of environmental protection is further removed from the immediate problems and sources of pollution.

It was explained under Point 3.3.3.6 why there are more highly qualified persons performing environmental protection and air pollution control tasks in the public service than in the industrial sector. A comparison between the private sector and the public service shows that the latter does not have certain, less complex environmental occupational profiles, such as were described in the synthesis report on the industrial sector. This is especially true of the process and interdisciplinary technical services and the installation-related functions (see Nitschke in publication). Public companies as a special case, must be excluded from the above; on the whole the same functions can be found in these as in private companies (e.g. the measurements controller 5Bb whose work relates to installations).

Leaving aside the relation of the two sides to the problem, many parallels can be drawn between the different occupational functions in the public and private sectors. Analogous to the categories in the synthesis report, when examining the public service it is also possible to speak of "environmental protection management" or "environmental protection coordination". These functions are commonly found in policy-making, but they also occur for instance in centralized inspection and control. The fact that the governmental research function could be identified made it obvious that the public service also deals with "environmental research". Similarly, the existence of positions for "chairpersons for environmental protection" can be derived from the governmental information function. Finally, the governmental inspection and control function also includes the environmental occupational profile of "process and interdisciplinary pollutant inspector".

All these activities are characterized by the fact that the involvement with the object and the target groups are not only more distant but also more open and general. The groups that environmental protection management are addressing do not come from a single organization; environmental research serves the general public to a greater extent, the presentation of environmental issues is directed at various target groups among the public; and inspection and control is carried out in many companies. In keeping with its fundamental character, the public service is "more public" than the private sector with regard to the occupational profiles actually examined in the field of air pollution control. This was also obvious in above-described greater openness and in the intensity of the communication among the interviewees. Communication and cooperation are intensely maintained as a means of obtaining necessary information and to present and transfer knowledge and findings.

The view of environmental occupational profiles in the public service as they have been characterized to date needs to be revised, however, with regard to their "remoteness from the problem" because governmental institutions also cause direct environmental pollution. The persons working in the respective institutions contribute their share as well.

Our survey has shown that ecologically oriented efforts similar to "environmentally friendly production" in the industrial sector have not as yet got past the first post. Using recycled paper or diesel-driven vehicles were two of the few things named in response to the question about "environmental protection in their own institution". The partial changeover to environmentally sound and healthy food in the cafeteria in the case of 1A is the exception. The same holds true for the "environmentally friendly procurement" team in 2A/4A. A gradual "production changeover" in this sense is certainly important for all authorities. Such changes should be implemented in environmental authorities in particular since they function as examples for the rest of society. Hardly any institutional requirements for tasks so close to the problem as these exist to date.

Moreover, the work of governmental institutions is also environmentally relevant and thus close to the problem. This is obvious in the case of environmental programmes. What is more, most of the programmes and measures taken by the administrations of the various departments cause environmental pollution themselves. There are the rare exceptions which make a contribution to pollution reduction through direct or indirect interaction with other measures (building policy, energy policy, traffic policy, economic policy, etc.). No adequate provision for dealing with this can be seen in the structure of the authorities.

Comparing the different angles and looking at the cases examined, we can also say that the current environmental occupational profiles in the public service seem to be subject to far fewer dynamic changes than those in the private sector (see also Nitschke/Schumann 1990, p. 42 ff). On the whole, their current structure has not undergone any change for quite some time. This relative rigidity would also coincide with the typical image most people have about the public service. However, the more rigid order could be due to the fact that the process of looking for suitable forms of organizing environmental protection responsibilities has already come to an end while this process was still under way in the industrial companies surveyed a year ago. It is only relatively recently that they have become active in the private sector. From this point of view, the "rigidity" would rather express the "stability" of a later phase of dealing with environmental problems.

5.2 New requirements in the public service

5.2.1 Institutional change

Regardless of what may be the reasons for the lack of change in the surveyed environmental occupational profiles, it is most surprising that there have not been more modifications to occupational requirements considering the major changes that public institutions have been subject to in the past. Generally it holds true that because of their policy-making potential the five functions are subject to economic trends in environmental policy, fashions and priorities set at upper and top levels. Even the inspection and control activities of the factory inspectorate which are most closely tied to legal and administration regulations, have been directly influenced by concern about carcinogenic substances.

Some marked shifts in the tasks of the surveyed institutions could be observed. The Berlin Senate Department for Urban Development and the Environment now has the entire east German area surrounding Berlin added to its responsibilities. This has not only led to an extension in the range of its sphere of competence (e.g. in case of 2A with the air measurement network) and an increase in its tasks, but also to setting new priorities. The term, "Ecological Rehabilitation Programme", is an expression of this. The sheer size of the environmental problems in eastern Germany make new forms of coordination in the public and semi-public sectors necessary (e.g. a so-called "service corporation" which is supposed to combine environmental protection policy and labour market policy).

Beside the challenges in eastern Germany, other new forms of coordination were also observed. Sub-contracting programme management tasks to external managers, setting up competences for intermedial and integrated environmental policy and interministerial working groups provide further examples.

Changes in emphasis in pollution priority areas in general and progress in recognising problems have led to more and better observation and monitoring. Thus, we hear talk of "extending the range of substances" (3Ba) and "recording new classes of substances" (such as carbon dioxide and methane) (2Aa). These classes of substances are only one indication of how the new focus on "protecting the earth's atmosphere" is leaving its mark on the type of problems dealt with by the authorities. Some of these new interests have become embedded in institutional structures: a focal area of the work in 4A, an opportunity for Federal-Länder cooperation in 1A or even a specialized area in its own right at the Federal Environmental Agency.

5.2.2 Future occupational profiles in air pollution control

The checklist for the interviews did not only contain questions about new types of tasks to be fulfilled by the institutions but also about occupational profiles in air pollution control required in the future. If the requirements outlined by the interviewees are to be met adequately, there will be quite a lot of action overhauling these departments in the future. Altogether 51 statements could be evaluated in this respect.

Only four out of the 51 statements indicated that the existing qualifications would also be sufficient in future. In 1A, accordance between tasks and competences is based on the interdisciplinary structure of the section. As for the factory inspectorate (3B), the increasing restrictions placed on its work brought about by regulations is even leading to a curtailment of some requirements. In the garbage treatment plant (5B), increased automation in some working areas and the charging of other institutions with demanding tasks undermine the need for new qualifications.

Legal requirements as a stimulus

All other statements, some of which were made by the same interviewees with regard to other working areas, indicate increasing requirements. Only in two statements was no more detailed explanation given [more complicated measuring techniques in the future (2A); more in-depth knowledge of substances (5A)]. Otherwise, any concrete explanations were related almost exclusively to the newly required contents and hardly ever to the causes underlying them. From the few explanations offered, new laws such as the Assessment of Environmental Impact Law (UVPG) were nearly always mentioned. This legislation seems to create a need for biologists and ecologists primarily who are mainly required in the factory inspectorates. Experts in the fields of medicine and toxicology were also mentioned in connection with this law. In one instance the "chemicalization of technology" (5B) was cited to explain the need for chemists.

Increasing specialized requirements

A large complex of 25 statements relates to increased specialized requirements. Two variants are apparent here: the first is the concept of additional qualifications for employees, and the other is the concept of recruiting new specialized staff. The latter was articulated less frequently. It is interesting that no mention was made of the need for environmental experts. Only the deputy-head of the section (1Aa) and qualified environmental technicians were of the opinion that such specialized qualifications would be useful for making oneself familiar with a new job quickly.

Those employed in air pollution control will mainly be confronted with increasing requirements from the field of natural sciences as a result of the new and specialized contents. This applies especially to chemistry and the rather integrative subjects of biology and ecology. The second-largest group of statements made on specialized subjects was directed at technical and engineering qualifications, with process and measurement engineering being mentioned most frequently. As to be expected, the increased demand for such specialized qualifications was mentioned almost exclusively by interviewees working in research and inspection and control functions. In the remaining function areas, other specific specialized qualifications were referred to such as working with personal computers and the application of layout techniques when providing information to the public (4A).

More external and interdisciplinary competences

Without a doubt, the most important finding is the call for additional non-related and interdisciplinary competences; this need was sometimes expressed parallel to and sometimes in contradiction to the forecast of an increased demand for additional specialized qualifications. This aspect is sometimes broached when specialized contents are mentioned, i.e. when explicit subject combinations are touched on and when knowledge of different natural sciences are required at the same time. For instance, one interviewee (2Bb) sees an increasing demand for energy and process engineering technicians who should, however, be able to "take the whole process into consideration". The need for ecologists indicates the advance of integrated qualification profiles. In some cases a "less bureaucratic perspective" (1Ba) is called for or the need to "overlook the law occasionally" (5Aa) is stressed in connection with specialized administrative knowledge.

The number of times the concrete interdisciplinary aspects were cited (mentioned over 20 times) mainly indicates the extension of purely bureaucratic, technical and scientific work in authorities in the future. Seven interviewees called for an essentially different way of looking at problems, which in Frederik VESTER's terms can be designated as networked thinking. Statements such as "an awareness of integrated environmental protection" (1Ba), "a holistic way of seeing things" (2Aa), an "intermedial view" (2Ba), the need for "generalists instead of experts" (4Aa) or for "mental high-flyers" (5Aa) provide examples of this type of thinking.

Closely connected to the above are statements which amount to a "broadening" of horizons in the way one considers the issues [seeing "global effects of air pollution control" (2Aa); "doing research work on the causes of pollution" (2Ba)]. Another form of this wider viewpoint is the call for improved possibilities for implementation (mentioned three times). This would include e.g. "an eye for niches" in action in the administration (1Ba) or "limitations to implementation" (4Ba) as well as "establishing points of reference to on-site technology" (5Ab). It is probably not a coincidence that all these ideas did not come from interviewees in the area of inspection and control whose activities are subject to the narrowest specifications.

All sectors (except research) call for more importance to be placed on non-natural science qualifications and on social skills and/or personal qualities. The former includes economic and marketing knowledge as well as knowledge of planning laws and regulations (1Ba); the latter takes in "the power of persuasion when dealing with companies" (3Aa) and "civil courage, flexibility, ability to handle stress, communication skills" (4Bb). Knowledge of psychology was mentioned most frequently in this respect in order to be able to assess the behaviourial willingness of others better. Only one interviewee pointed out that such extended occupational profiles would also require the application of different learning forms in the training courses (project studies in the case of 1Ba).

This concludes our evaluation of the statements of the interviewees. Point 3.3.3.6 showed some discrepancies between requirements and existing competences in the current situation. The real competence deficit is still to come judging by the information on new tasks awaiting the authorities and the systematic forecast of the insiders. Networked thinking on an extended natural science and technical basis, supplementary knowledge in the social science and economic fields, competence in taking action and communication are just some of the requirements which have to be taken to heart in future policy.

5.3 Approaches to policy-making

5.3.1 An institutional innovation

As mentioned above, the public service is not so "remote from problems" as is often generally presumed. In our opinion, a new institution should be set up to minimize the pollution the public service itself generates and to utilize untapped potential for reducing environmental pollution. Environmental protection officers and/or environmental protection coordinators should be employed to deal explicitly with these issues within the authorities (a self-reflection process in the administration). Depending on the size of the authority and the need for action, individual positions or larger teams could be set up. In any case, they should have a high position in the hierarchy. It would also make sense to anchor them in all departments and not simply in the environmental administration.

These positions should focus on "environmentally friendly production" and "environmentally friendly products" within the administration. Ensuring environmentally friendly services in administration requires that environmental protection coordinators are actively involved in policy-making in the various political fields in the sense of promoting interdepartmental exchange of experience and correlating the work of various departments. Air pollution in particular is a prime example of the need for "interministerial" work. Moreover, activities prior to and following the work of authorities must also be taken into consideration. Here evaluation of the ecological effectiveness of measures which have already been conducted are pitted against the preventive identification of environmentally relevant interfaces between different political fields.

Finally, the environmental protection officers would have a central function in the vocational environmental training of staff responsible for conventional environmental protection tasks in the public service. Wherever further training officers are already employed in authorities, concerted action presents itself. Apart from the exchange of experience which facilitates the learning process and reciprocal counselling, existing further training courses related to the environment should be increased in number and the quality of them improved.

5.3.2 Environmentally oriented personnel and education policy

Improving the quality of further training can begin at two points. The first could be in-house further training which could do a great deal to intensify direct "self-reflection". Here, environmental statutory regulations and administrative practices should be placed in the foreground. In contrast to this - except if suitable personnel is available among the administration's own workforce - the task of providing training to deepen specialized knowledge and extend interdisciplinary competences should be left to external providers. The second point takes in examining and assessing external offers, transferring relevant information to interested persons as well as promoting their willingness to participate in continuing training courses. In both cases, the (environmental) educational quality of the learning methods as a yardstick for assessment, and guidelines for behaviour must not be neglected.

Lawyers and engineers seem to be especially important as target groups. Lawyers often hold positions of power and function as coordinators in many authorities while their qualifications are frequently far too removed from the issues for them to have a sound understanding of environmental problems. Moreover, fundamental problems in understanding often seem to exist between administrative experts and specialized scientists. For this reason alone, the need for ecological sensitization of classical administrative staff is an obvious one. Engineers are also important since their ability to engage in "networked thinking" seems to be little developed (at present).

Without any doubt, further training in such areas has only a limited effect and needs to be supplemented in two ways. Firstly, a modified recruitment policy is necessary to ensure that divisions are composed of staff with more diversified qualifications which will inevitably create "compulsory interdisciplinary dialogue". While we can credit personnel policy for having paid great attention so far to their staff having acquired sufficient occupational experience in the private sector, a ramified system of on-the-job training should be introduced in various authorities. This on-the-job training should be undertaken by the respective staff at repeated intervals in order to draw them away from their everyday work and familiarize them with the tasks and functions found in governmental sub-divisions which normally act quite independently from each other. Admittedly, a thorough administrative reform would be necessary for this, however.

Recruitment policy will also have to pay more attention to new occupational profiles in environmental protection where obsolete qualifications no longer keep pace with new requirements.

The last aspect we wish to mention draws attention to the second area requiring change; a new method for training future public service employees responsible for environmental protection is needed. Apart from the general integration of environmental protection contents into training courses, training institutions established specifically for the training of public servants have to be ecologically conscious above all else. A few examples having positive approaches were mentioned in the last chapter. Experience gained from successful examples (which may of course also originate in other areas) must be evaluated to facilitate their transfer to the many training institutions that have not yet been exposed to them. Only then will holistic vocational environmental training in the public service be more than mere academic wishful thinking, an exotic compartmentalized culture or the prerequisite for individual action which will have virtually no consequences.

Glossary of authorities and establishments of higher education

Bayerische Beamtenfachhochschule
Bavarian Civil Servants Institute

Bundesanstalt für Arbeit
Federal Labour Office

Bundesminister für Umwelt, Naturschutz und Reaktorsicherheit (BMU)
Federal Minister of the Environment, Nature Conservation and Nuclear Safety

Bundesverband Junger Unternehmer
Federal Association of Young Entrepeneurs

Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt e.V.
German Research Institute for Space and Aeronautics

Der Minister für Natur, Umwelt und Landesentwicklung Schleswig-Holstein
The Ministry of Nature, Environment and Regional Development, Schleswig-Holstein

Fachhochschule der Polizei
Police Institute

Fachhochschule für öffentliche Verwaltung - Fachbereich Polizei
Institute of Public Administration - Faculty of the Police

Fachhochschule für öffentliche Verwaltung
Institute of Public Administration

Gesellschaft für Weiterbildung und Umweltschutz
Society for Continuing Training and Environmental Protection

Haus der Technik
House of Technology

Hochschule für Verwaltungswissenschaften
University of Administrative Sciences

Hochschule für Verwaltungswissenschaften Speyer
University of Administrative Sciences in Speyer

Informations- und Messausbildungs Zentrum Immissionsschutz (IMIS)
Information and Measurements Training Center, Air Pollution Control

Institut für kommunale Wirtschaft und Umweltplannung (IKU) Institute of Municipal Economy and Environmental Planning

Kernforschungsanlage Jülich GmbH
Jülich nuclear research plant

Landesanstalt für Immissionschutz Nordrhein-Westfalen
Regional Office for Pollution Control North Rhine-Westphalia

Pädagogische Hochschule in Ludwigsburg
Teacher Training University in Ludwigsburg

Studienführer Umweltschutz
University Guide to Environmental Protection

Technische Überwachungsverein (TÜV)
Technical Inspection Association

Umweltakademie Schleswig-Holsteins
Environmental Academy of Schleswig-Holstein

Umweltbundesamt
Federal Environmental Agency

Verein Deutscher Ingenieure (VDI)
Association of German Engineers

Verwaltungsfachhochschule Altenholz
Institute of Administration in Altenholz

Zentrum für Energie-, Wasser und Umwelttechnik (ZEWU)
Energy, Water and Environmental Technology Centre

Zweckverband Müllverwertungsanlage Ingolstadt (MVA)
Ingolstadt special-purpose association garbage treatment plant

Glossary of legislation

Assessment of Environmental Impact Law
Umweltverträglichkeitsprüfungsgesetz (UVPG)

Federal Emission Protection Law
Bundesimmissionsschutzgesetz (BImSchG)

Petrol Lead Law
Benzinbleigesetz

Technical Instructions for Controlling Air Pollution
Technische Anleitung zur Reinhaltung der Luft (TA Luft)

Urban and Regional Planning Law
Raumordnungsgesetz (ROG)

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UBA (Umweltbundesamt) (pub.) (1986): Umweltbezogene Fort- und Weiterbildung mit Kommunalpolitikern und Verwaltungsmitarbeitern. Berlin

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UBA (pub.) (1990): Fortbildung zum Thema Ökologie/ Umweltschutz - Lehrgangsmaterialien für die Polizei. Berlin

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Annex 1: Interview checklist for "New occupational profiles in the field of environmental protection in the public service sector - with reference to air pollution control"

Section A:

1. Name, address of public institution

2. Brief background information on the main interviewee
   a) Name
   b) Position, function, length of time the interviewee has been employed in the institution

3. Second interviewee

Section B: General information on the public institution

4. What exactly are the tasks of the authority or public institution?

5. What are their most important tasks?

6. Where and how can the institution be slotted into the state infrastructure of air pollution control policy (e.g. higher and lower authorities, coordination with other state agencies, etc.)?

7. How long has the institution or division been in existence with tasks specific to the environment? Why was it established and upon whose instructions?

8. Please outline the history of the institution.

9. What are the most important tasks of your division?

10. What is the organizational structure of the institution in so far as this is relevant to air pollution control? (Organigram)

11. Number of employees (differentiated between public servants, blue- and white-collar workers)
    a) in the entire institution
    b) in the division
    c) dealing directly with air pollution control tasks.
    d) Is the number in the latter group large enough to carry out the necessary tasks properly?

12. Roughly assess the qualification structure (formal educational level: high, middle, low, etc.)

13. Does your institution provide systematic initial and continuing training?

14. If so, what is the scope and nature of this (initial and) continuing training?
    a) Who receives the training?
    b) Is it voluntary or mandatory?
    c) Is it in-house or external? (what kind of external institutions?)

d) How many attend per year and from which group(s), average length of courses?

15. If appropriate: How many such institutions are there in the region or in the country?

Section C: Concrete measures in the field of air pollution control

16. Who authorizes the measures carried out by your division?

17. What measures have been carried out, are being carried out or are planned?

18. To what extent are they linked to other measures of environmental policy or environmental technology?

19. If appropriate: What about environmental protection in your institution (recycling, energy conservation, etc.)?

20. Depending on the type of function:
    a) "Policy-making"
    e.g.: Extent, type, etc. of measures. Target groups.
    b) "Research", "measuring pollutants" variant
    e.g.: How are measurements taken? What techniques are used?
    c) "Inspection and Control"
    e.g.: How is inspection and control organized?

d) "Information"
e.g.: What kind of information aids are used?

e) "Public companies"
e.g.: Status/importance of environmental protection (indicators such as formulated models, environmental reports), organization of environmental protection (e.g. staff positions, works commissioner)

21. What developments do you expect regarding air pollution control and your sphere of responsibility?

Section D: Types of job and tasks

22. Please outline the occupational functions in your institution and your division which are relevant to air pollution control:

a) Examples of persons working entirely in the field of air pollution control whose tasks deal specifically with environmental matters (IA)

b) Examples of persons responsible part-time for air pollution control tasks (apart from their "normal" duties) (IIA)

c) Examples of persons working exclusively in the service of air pollution control without this bearing an effect on the job requirements for their position (IB)

d) Examples of persons performing their "normal" duties but for whom environmental protection has become an integral and essential part of their occupational activities (IIB)

23. Please select some of the most important functions and describe them on the basis of the following checklist. Do not describe your own position here as we will return to that later on.

  a) Name of the job
  b) Position in the hierarchy: responsibility (who organizes, who performs the tasks); competence to issue instructions
  c) (Core) tasks
  d) Existing competences
  e) Formal educational requirements; environmentally related initial and continuing training
  f) Access, certificate/title, statutory foundation, contractual agreement between the social partners

24. Assessment of future occupational profiles
  a) What effect will future environmental policy have on the job requirements in your institution and elsewhere in the public service sector?
  b) What qualifications will be needed to an increasing extent for air pollution control and environmental protection in general?
  c) Will you need persons with special training in environmental protection for certain tasks?

Section E: Detailed survey of the occupational profile

(Interview with person carrying out the function): Now we would like to discuss your own activities in much greater detail.)

25. If still not known: Title of position - How long have you held this position? - How long have you been employed in this institution? - What did you do prior to this?

26. If still unknown: Position in the hierarchy

27. Core tasks
    - a) Subject/contents/purposes/objectives
    - b) Resources for carrying out tasks (technical equipment, etc; administrative instruments, environmentally related information instruments (see also Cooperation)
    - c) Stage of process (planning, implementation, control)
    - d) Scope for action (number of alternatives; degree of routine or extent of diversity; possibilities of taking action in the event of conflicts)

Scale:

theoretically		in practical terms
	no	
	little	
	medium	
	high	

What might be the reasons for a possible discrepancy?

e) Amount of time needed for air pollution control tasks (hours per week)

f) Cooperation - horizontal: internal, external partners; form of cooperation

g) Cooperation - vertical: relationship with superiors and subordinates

28. Competences in CEDEFOP terminology - in the ecological sense: what kind of qualifications, skills and abilities, etc. do you need to do your job properly?

Let the interviewee express him-/herself in own words first!

a) with regard to "qualifications": knowledge about air pollution control problems in own job and in the company/institution; knowledge of relevant standards, measures to be taken; interdisciplinary knowledge; general education with regard to the environment, awareness; institutional knowledge

b) with regard to "competences": practical knowledge, aptitudes, skills needed to achieve air pollution control objectives (e.g. manual skills, but also knowledge of electronic data processing, etc.)

c) with regard to "social requirements; attitudes": personal attitude to environmental protection - Does own attitude and motivation play a role in fulfilling tasks? -

Is it (sometimes) important to be able to assert yourself?

29. Initial and continuing training relating to the environment

a) Training institution (school, in-house, continuing training establishment, etc.)
b) Type of training (contents, cost, formal qualification at end, composition of class, duration, frequency, teaching methods (lectures, projects, excursions, etc.))

30. Entrance requirements: formal qualifications, certificates, statutory regulations, plant agreements, etc.

Annex 2: Chart of the institutions and interviews

Function	Specific.	Instit.	Main interviewee	Second interviewee
Policy-making (1)	Environm. authority	Sen.Dept.for Urb.Dev.& the Environment Berlin	Deputy-head of Sect. Envir.Promotion Programmes, etc. (1Aa)	Clerk ditto (1Ab)
	Other authority	Min. of Soc. Affairs, Health & Energy S.-Holstein	Expert for energy planning and counselling (1Ba)	Clerk ditto (1Bb)
Research (2)	Measurements	Fed.Environm. Agency, pilot station Frankfurt/M	Head of the measur. network (2Aa)	Clerk measur. network (2Ab)
	"Clean technologies"	Reg.Off. for Pollution Control NRW	Head of Section (2Ba)	
Inspection and control (3)	centralized	Min.of Nature, Envir. & Reg. Development S.-Holstein	Expert for Pollution Control (3Aa)	Clerk ditto (3Ab)
	decentral.	Factory Inspectorate Itzehoe/Kiel	Head of Environmental Protection div. (3Ba)	Clerk Kiel (3Ca)
Information (4)	centralized	Fed. Environ. Agency Press Department	Deputy head PR section (4Aa)	
	decentral.	Envir.Office Frankfurt/M	Head of Pollution Control Division (4Ba)	Envir. counsellor Information Div. (4Bb)
Public companies (5)		Berlin Traffic Association	Head of Envir. Protection Section (5Aa)	Pollution control officer (5Ab)
		Garbage treatment plant Ingolstadt	Plant manager (5Ba)	Measurements Controller (5Bb)

Annex 3: Classification of the environmental occupational profiles according to the four occupational function types

Function type IA (N=12)

directly surveyed occupational profiles (N=5)

Deputy-head of the specialized field for pollution measurement, measurement network section and head of the measurement network, Federal Environmental Agency (2A)

Heating installations... head of section, Regional Office for Pollution Control (2B)

Head of the Pollution Control department, Environmental Office (4B)

Pollution control officer, public transport company (5A)

(Head of the Environmental Protection group, factory inspectorate (3B))

indirectly surveyed occupational profiles (N=7)

Head of pollution measurement and measurement network section, Federal Environmental Agency (2A)

Scientific assistant, measurement network (2A)

Measurement technician, measurement network (2A)

Head of Air Pollution Control Technology and Fault Prevention Division, Regional Office for Pollution Control (2B)

Group leader for prevention, abatement and treatment technologies (2B)

Expert for plants requiring authorization in the Work Environment, Pollution Control division, Ministry of Nature, the Environment and Regional Development (3A)

Environmental engineer, Pollution Control Section, Environmental Office (4B)

Function type IB (N=2)

directly surveyed occupational profiles (N=1)

Clerk (2Ab)

indirectly surveyed occupational profiles (N=1)

Electronic data processing clerk, Pollution Control division, factory inspectorate (3A)

merely mentioned are:

Driver (2A)

Secretary (2A, 3B)

Administration (2B, 3B)

Function type IIA (N=5)

directly surveyed occupational profiles (N=3)

Expert in the Work Environment and Pollution Control division, Ministry of Nature, the Environment and Regional Development (3A) (at the same time function type of IIB also)

Clerk, Work Environment and Pollution Control division, Ministry of Nature, the Environment and Regional Development (3A)

Clerk, factory inspectorate (3C)

indirectly surveyed occupational profiles (N=2)

Environmental counsellor, Environmental Office currently with an emphasis on air pollution control (4B)

Administrative clerk, pollution control section, Environmental Office (4B)

Function type IIB (N=28)

directly surveyed occupational profiles (N=9)

Deputy head of department, Senate Department for Urban Development and the Environment (1A)

Administrative clerk, Senate Department for Urban Development and the Environment (1A)

Expert for the promotion area (programme) of energy planning and counselling, Ministry of Social Affairs, Health and Energy (1B)

Clerk, energy planning and counselling, Ministry of Social Affairs, Health and Energy (1B)

Scientific employee in the section dealing with provision of information to the public (4A)

Environmental counsellor, Information Division, Environmental Office (4B)

Head of Environmental Protection Department, public transport company (5A)

Technical plant manager, garbage treatment plant (5B)

Measurements controller, garbage treatment plant (5B)

indirectly surveyed occupational profiles (N=19)

Head of Section, Senate Department for Urban Development and the Environment (1A)

Group leader, environmental promotion programme, Senate Department for Urban Development and the Environment (1A)

Expert for energy control, Ministry of Social Affairs, Health and Energy (1B)

Expert for renewable sources of energy, Ministry of Social Affairs, Health and Energy (1B)

Clerk, energy concepts, Ministry of Social Affairs, Health and Energy (1B)

Head of the division, energy management, Ministry of Social Affairs, Health and Energy (1B)

Head of Work Environment and Pollution Control Divison, Ministry of Nature, the Environment and Regional Development (3A)

Clerk for the economic area of energy and heating, factory inspectorate (3B)

Clerk for the economic area of agriculture, factory inspectorate (3B)

Head of section dealing with provision of information to the public, Federal Environmental Agency (4A)

Head of Environmental Counselling Division, Environmental Office (4B)

Environmental Counsellor for Procurement and Waste Disposal, Environmental Office (4B)

Head of Work Safety and Environmental Protection division, public transport company (5A)

Officer for soil and water protection (5A)

Shift foreman, garbage treatment plant (5B)

Industrial waste disposal counsellor, garbage treatment plant (5B)

Crane operator, garbage treatment plant (5B)

Plant electrician, garbage treatment plant (5B)

Annex 4: Distribution of tasks in the field of air pollution control

1. Policy-making (N=23)

1.1 Concept, planning, development, decision-making (N=18)

1.2 Establishing ecological standards (N=5)

2. Gathering subject-related information (N=19)

2.1 Gathering primary data (N=11)

2.2 Processing secondary data (N=8)

3. Communication (N=53)

3.1 Internal communication (N=23)

3.1.1 Personnel management and organization of personnel (N=9)

3.1.2 Interdepartmental (within the authority) communication (N=14)

3.2 External communication (N=30)

3.2.1 Cooperation in order to fulfil tasks (N=11)

3.2.2 Public relations work (N=2)

3.2.3 Provision of information to the general public (N=5)

3.2.4 Guidance and answering enquiries (specific persons/groups) (N=12)

4. Administrative examination and implementation (N=28)

4.1 Application of standards to specific situations (N=10)

4.2 Simple administrative work in the narrow sense (N=12)

4.3 Performing other tasks (N=6)

5. Technical and operative implementation (N=7)

5.1 Servicing and maintenance of installations (N=2)

5.2 Inspecting installations

5.3 Carrying out protective measures (N=3)

6. Direct inspection and control (N=2)

Annex 5: Distribution of the required competences in the field of air pollution control

1. Specialized knowledge (N=43)

1.1 Knowledge of legislation and administration (N=11)

1.2 Technical knowledge (N=14)

1.3 Knowledge of natural sciences (N=12)

1.4 Knowledge of social sciences (N=2)

1.5 Knowledge of economics (N=4)

2. Interdisciplinary knowledge (N=18)

2.1 Thinking beyond the limits of one's own occupation (N=7)

2.2 Ability to orientate oneself (N=11)

3. Knowledge based on experience (N=22)

4. Competence in taking action and communication skills (N=27)

4.1 Ability to convince people (N=10)

4.2 Cooperation and communication skills (N=8)

4.3 Assertiveness (N=9)

5. Motivation, attitude, awareness (N=11)

5.1 Environmental protection attitudes (N=9)

5.2 Positive attitude towards "serving the state" (N=2)

6. Competences in the narrow sense (N=11)

Annex 6: Individual occupational profiles - classified according to public service function and case studies

Annex 6.1

1.	Type of function:	Policy-making
2.	Authority:	Senate Department for Urban Development and the Environment, Berlin
3.	Title of interviewee's position (Code No.):	Deputy head of the Environmental Research and Technology Development section **(1Aa)**
4.	Function type:	IIB
5.	Job description:	Public servant; programme planning, internal and external coordination of work, examining applications, expert opinions on policy
6.	Duties according to Annex 4:	1.1; 1.2; 2.2 3.1.1; 3.1.2; 3.2.1 4.1; 4.2
7.	Other aspects of duties:	Enough personnel to carry out tasks, large degree of freedom in carrying out duties, admittedly only indirect control; much team work, interdepartmental cooperation
8.	Required competences in accordance with Annex 5:	1.3 3 4.2; 4.3 5.1
9.	Vocational training qualifications:	Diploma in environmental technology
10.	Entry qualifications/Professional experience:	Scientific work in environmental research (while completing doctorate)

11.	Vocational training related to the environment:	See training qualifications: no formal further training but self-study, visits to trade fairs, workshops

Annex 6.2

1.	Type of function:	Policy-making
2.	Authority:	Senate Department for Urban Development and the Environment, Berlin
3.	Title of interviewee's position (Code No.):	Administrative clerk in the Environmental Research and Technology Development section (**1Ab**)
4.	Function type:	IIB
5.	Job description:	Administrative and budgetary implementation of projects and contracts; handling of finances for many depts; involved the ecological rehabilitation programme; PR work
6.	Duties according to Annex 4:	1.1 2.2 3.1.1; 3.1.2; 3.2.1; 3.2.2 4.1; 4.2
7.	Other aspects of duties:	Broad spectrum of tasks, large degree of freedom in carrying out duties, free to structure own time, right to a say in decisions
8.	Required competences in accordance with Annex 5:	2.1; 2.2 3 4.2: 4.3 5.1 6
9.	Vocational training qualifications:	Most recent: Higher education degree in social education

10.	Entry qualifications/Professional experience:	(19 years) as an office clerk at a university, secretary and administrative clerk; application for job with the Senate Department as a result of interest in ecological matters
11.	Vocational training related to the environment:	No formal education in environmental issues; attendance at congresses

Annex 6.3

1.	Type of function:	Policy-making
2.	Authority:	Ministry of Social Affairs, Health and Energy, Schleswig-Holstein
3.	Title of interviewee's position (Code No.):	Expert, Dept. of Energy Management **(1Ba)**
4.	Function type:	IIB
5.	Job description:	Preparing concepts for development areas: energy planning and counselling; organization of energy research; international cooperation
6.	Duties according to Annex 4:	1.1 3.1.2; 3.2.4 4.1
7.	Other aspects of duties:	No opportunities for direct intervention; soft instruments only; a high degree of autonomy in distribution, in practical terms without great effect; cooperation with science and with Scandinavian authorities
8.	Required competences in accordance with Annex 5:	1.1; 1.3; 1.4 3 4.2: 4.3 5.
9.	Vocational training qualifications:	Diploma in engineering for urban and regional planning
10.	Entry qualifications/Professional experience:	2 years at the Institute of Housing and the Environment; employed in this division since it became part of the Ministry in 1988: 4 years administrative work

11.	Vocational training related to the environment:	See training qualifications and work experience; private study of the Danish energy model

Annex 6.4

1.	Type of function:	Policy-making
2.	Authority:	Ministry of Social Affairs, Health and Energy, Schleswig-Holstein
3.	Title of interviewee's position (Code No.):	Clerk, Div. of Energy Management **(1Bb)**
4.	Function type:	IIB
5.	Job description:	Energy planning and counselling in municipalities, etc; preparation of work for experts and head of the division; work connected with pilot projects on alternative sources of energy
6.	Duties according to Annex 4:	1.1 3.2.4 4.1
7.	Other aspects of duties:	-
8.	Required competences in accordance with Annex 5:	1.5 3. 4.1; 4.3 5.1 6.
9.	Vocational training qualifications:	Diploma in mechanical engineering
10.	Entry qualifications/Professional experience:	Employment in energy management
11.	Vocational training related to the environment:	None

Annex 6.5

1.	Type of function:	Research
2.	Authority:	Federal Environmental Agency, air measurement network, pilot station, Frankfurt/M
3.	Title of interviewee's position (Code No.):	Deputy-head of specialized field "Measurement of Pollutants, Measurement Network" **(2Aa)**
4.	Function type:	IA
5.	Job description:	Technical supervision of measurement stations; writing reports; scientific evaluation; supervising international research
6.	Duties according to Annex 4:	1.1 2.1; 2.2 3.1.2
7.	Other aspects of duties:	Highly time-intensive; autonomous work; multifaceted national and international cooperation
8.	Required competences in accordance with Annex 5:	1.2; 1.3 4.1; 4.2; 4.3 6.
9.	Vocational training qualifications:	Higher education in meteorology
10.	Entry qualifications/Professional experience:	Research work in Canada; employment in an environmental protection authority
11.	Vocational training related to the environment:	See training qualifications; attendance at further training sessions; own scientific work and lectures on the subject

Annex 6.6

1.	Type of function:	Research
2.	Authority:	Federal Environmental Agency, air measurement network, pilot station, Frankfurt/M
3.	Title of interviewee's position (Code No.):	Clerk at the pilot station **(2Ab)**
4.	Function type:	IB
5.	Job description:	Technical employee; supervision of measurements; processing and transmission of data using EDP
6.	Duties according to Annex 4:	1.1 2.1; 2.2 3.1.2
7.	Other aspects of duties:	Fixed tasks; little autonomy; extension of autonomy through own initiative
8.	Required competences in accordance with Annex 5:	1.2; 1.3 2.2 6.
9.	Vocational training qualifications:	Chemical laboratory assistant
10.	Entry qualifications/Professional experience:	Employment in chemical companies; 2 semesters of biology; autodidactic continuing training in electronic data processing
11.	Vocational training related to the environment:	None

Annex 6.7

1.	Type of function:	Research
2.	Authority:	Regional Office for Pollution Control, North Rhine-Westphalia
3.	Title of interviewee's position (Code No.):	Head of the Heating Installations, Extraction and Processing of Metal, Rock, Stone and Related Mineral Products Disposal Plants section **(2Ba)**
4.	Function type:	IA
5.	Job description:	Coordination of the section; research, expert opinions on the level of technology in limiting emissions
6.	Duties according to Annex 4:	1.2 2.1; 2.2 3.1.1; 3.2.4
7.	Other aspects of duties:	Constantly expanding workload; cooperation with corresponding regional institutions and establishments, with the authorities of other federal Laender and private engineering offices
8.	Required competences in accordance with Annex 5:	1.1; 1.2 2.1 3. 4.3
9.	Vocational training qualifications:	Higher education in chemical technology
10.	Entry qualifications/Professional experience:	Employment in plant construction (exhaust gas cleaning systems)

11. Vocational training related to the environment: None

Annex 6.8

1.	Type of function:	Inspection and Control
2.	Authority:	Ministry of Nature, the Environment and Regional Development, Schleswig-Holstein
3.	Title of interviewee's position (Code No.):	Expert," Work Environment and Pollution Control" division **(3Aa)**
4.	Function type:	IIB+IIA
5.	Job description:	Basic techinical matters related to the factory inspectorates; part-time: inspection and control functions
6.	Duties according to Annex 4:	1.1; 1.2 2.2 3.1.2; 3.2.4 4.1; 4.2
7.	Other aspects of duties:	Acute lack of time; little autonomy due to stringency of legal requirements; cooperation with inspection and control authorities
8.	Required competences in accordance with Annex 5:	1.1; 1.2; 1.3; 1.4 2.1 3. 5.1
9.	Vocational training qualifications:	Engineer
10.	Entry qualifications/Professional experience:	Previously deputy-head of a factory inspectorate; in the Ministry since 1990
11.	Vocational training related to the environment:	No specific training in environmental protection; work as a lecturer

Annex 6.9

1.	Type of function:	Inspection and Control
2.	Authority:	Ministry of Nature, the Environment and Regional Development, Schleswig-Holstein
3.	Title of interviewee's position (Code No.):	Clerk,"Work Environment, Pollution Control" division **(3Ab)**
4.	Function type:	IIA (+IIB)
5.	Job description:	Part-time duties: responsible for air pollution control; processing enquiries and complaints; implementing ideas of the head of section
6.	Duties according to Annex 4:	3.2.1; 3.2.4 4.1; 4.3
7.	Other aspects of duties:	Very large workload, too little time to solve all-embracing tasks; little autonomy
8.	Required competences in accordance with Annex 5:	1.1; 1.2; 3. 5.1
9.	Vocational training qualifications:	Steel construction fitter
10.	Entry qualifications/Professional experience:	Training for the senior technical service; section clerk since 1985
11.	Vocational training related to the environment:	None

Annex 6.10

1.	Type of function:	Inspection and Control
2.	Authority:	Factory inspectorate, Itzehoe
3.	Title of interviewee's position (Code No.):	Head of the Pollution Control Division **(3Ba)**
4.	Function type:	IA (IIB)
5.	Job description:	Coordinating agency for inspectorate management; Instruction and supervision of staff; setting of priorities for inspection and control
6.	Duties according to Annex 4:	2.2 3.1.1; 3.1.2; 3.2.1 4.1; 4.2 6.
7.	Other aspects of duties:	Great shortage of personnel and time; autonomy only possible where legal scope is left open: cooperation with inspection and control bodies; communication with companies
8.	Required competences in accordance with Annex 5:	1.1; 1.2; 1.3 2.1 3. 4.1 5.2
9.	Vocational training qualifications:	Higher education in process engineering
10.	Entry qualifications/Professional experience:	Experience in industry; following two years preparatory service, 7 years service
11.	Vocational training related to the environment:	None

Annex 6.11

1.	Type of function:	Inspection and Control
2.	Authority:	Factory inspectorate, Itzehoe
3.	Title of interviewee's position (Code No.):	Clerk (3Ca)
4.	Function type:	IIB
5.	Job description:	Processing authorization procedures; inspecting and controlling plants; issuing contracts for inspection and control measurements
6.	Duties according to Annex 4:	2.2 3.2.1 4.1; 4.2 6.
7.	Other aspects of duties:	Inspections at own discretion, otherwise hardly any autonomy; cooperation with various authorities concerning authorizations
8.	Required competences in accordance with Annex 5:	1.1; 1.3 3. 5.2 6.
9.	Vocational training qualifications:	Diploma in chemical engineering
10.	Entry qualifications/Professional experience:	Employed after preparatory service
11.	Vocational training related to the environment:	None; attendance at congresses

Annex 6.12

1.	Type of function:	Information
2.	Authority:	Federal Environmental Agency
3.	Title of interviewee's position (Code No.):	Deputy head of section dealing with provision of information to the public **(4Aa)**
4.	Function type:	IIB
5.	Job description:	Scientific assistant; publication and supervision of information media; concepts for and planning of work
6.	Duties according to Annex 4:	1.1 3.1.2; 3.2.1; 3.2.2; 3.2.3; 3.3.4
7.	Other aspects of duties:	Low budget; basic control of all media "from above"; much external cooperation
8.	Required competences in accordance with Annex 5:	1.1; 1.3 2.2 3. 4.1; 4.2
9.	Vocational training qualifications:	Higher education in chemistry and political sciences; doctorate
10.	Entry qualifications/Professional experience:	Environmental analytical knowledge through chemistry studies; following second course of studies and doctorate, specialized high-grade employee (in "Product-related Environmental Protection")
11.	Vocational training related to the environment:	None

Annex 6.13

1.	Type of function:	Information
2.	Authority:	Environmental Office, Frankfurt/M
3.	Title of interviewee's position (Code No.):	Head of Pollution Control Section **(4Ba)**
4.	Function type:	IA
5.	Job description:	Personnel management; strategy development; project planning; inspection and control: preparatory work for the information division
6.	Duties according to Annex 4:	1.1; 1.2 2.1; 2.2 3.1.1; 3.1.2; 3.2.4 4.2
7.	Other aspects of duties:	Very broad spectrum of tasks; personnel shortage; relatively high level of autonomy except in inspection and control tasks; intensive cooperation
8.	Required competences in accordance with Annex 5:	1.1 2.1; 2.2 3. 4.1; 4.2
9.	Vocational training qualifications:	Diploma in meteorology, specialized in air climate and air chemistry
10.	Entry qualifications/Professional experience:	-
11.	Vocational training related to the environent:	See vocational training qualifications; attendance at relevant events (congresses, etc.)

Annex 6.14

1.	Type of function:	Information
2.	Authority:	Environmental Office, Frankfurt/M
3.	Title of interviewee's position (Code No.):	Environmental counsellor in the information and counselling division **(4Bb)**
4.	Function type:	IIB
5.	Job description:	Environmental counselling for enquiries (environmental telephone service; organization and conducting of information sessions)
6.	Duties according to Annex 4:	1.1 3.2.1; 3.2.3; 3.2.4 4.3
7.	Other aspects of duties:	Little autonomy, much administrative work; much external cooperation
8.	Required competences in accordance with Annex 5:	1.1; 1.3 2.1; 2.2 4.1; 4.3 6
9.	Vocational training qualifications:	Teacher and environmental counsellor
10.	Entry qualifications/Professional experience:	Training as an environmental counsellor in connection with practical experience to become an environmental counsellor
11.	Vocational training related to the environment:	See vocational training qualifications; constant informal on-the-job continuing training

Annex 6.15

1.	Type of function:	Public companies
2.	Authority:	Berlin Traffic Association
3.	Title of interviewee's position (Code No.):	Head of Environmental Protection section, waste disposal officer **(5Aa)**
4.	Function type:	IIB
5.	Job description:	Personnel management; preparation of guidelines; organization of training events
6.	Duties according to Annex 4:	1.1 2.1; 2.2 3.1.1; 3.1.2; 3.2.1 4.1; 4.2 5.3
7.	Other aspects of duties:	50 to 55 hours per week for environmental protection (including personal further training); much scope for using own initiative
8.	Required competences in accordance with Annex 5:	1.1; 1.2; 1.3; 1.5 3 4.1; 4.3 6
9.	Vocational training qualifications:	Chemical laboratory assistant
10.	Entry qualifications/Professional experience:	10 years of work in materials testing
11.	Vocational training related to the environment:	Continuing training to become a skilled worker for work safety, then officer for hazardous goods, radiation protection, waste

Annex 6.16

1.	Type of function:	Public companies
2.	Authority:	Berlin Traffic Association
3.	Title of interviewee's position (Code No.):	Pollution control officer **(5Ab)**
4.	Function type:	IA
5.	Job description:	Assessment of building projects with regard to pollution control legislation; assistance in planning installations; internal inspection and control
6.	Duties according to Annex 4:	4.3 5.1; 5.2; 5.3
7.	Other aspects of duties:	Implementation of statutory provisions has priority, therefore restricted autonomy
8.	Required competences in accordance with Annex 5:	1.2; 1.3 2.2 3 4.2
9.	Vocational training qualifications:	Higher education in materials sciences
10.	Entry qualifications/Professional experience:	Experience in industry; previously in the technology and research divisions of the Berlin Traffic Association
11.	Vocational training related to the environment:	Further training to become pollution control officer; attendance at relevant training events

Annex 6.17

1.	Type of function:	Public companies
2.	Authority:	Garbage treatment plant, Ingolstadt
3.	Title of interviewee's position (Code No.):	Technical plant manager **(5Ba)**
4.	Function type:	IIB
5.	Job description:	Responsible for the technical operation of the entire plant; instruction and supervision of personnel; planning of new buildings and installations
6.	Duties according to Annex 4:	1.1 3.1.1 5.1
7.	Other aspects of duties:	Large degree of autonomy exception for personnel planning and statutory regulations; cooperation with administrative management and external planning offices, construction companies
8.	Required competences in accordance with Annex 5:	1.1; 1.2; 1.3; 1.5 2.1; 2.2 3 4.2 5.1
9.	Vocational training qualifications:	Mechanical engineering
10.	Entry qualifications/Professional experience:	Employment in a power station

11.	Vocational training related to the environment:	Additional training courses on heating, fuelling and air conditioning techniques; other traditional technical further training related to the environment; private study of relevant specialized literature

Annex 6.18

1.	Type of function:	Public companies
2.	Authority:	Garbage treatment plant, Ingolstadt
3.	Title of interviewee's position (Code No.):	Measurements controller **(5Bb)**
4.	Function type:	IIB
5.	Job description:	Work in the central control station of the incinerator plant; monitoring measurements; fault reporting; minor maintenance work
6.	Duties according to Annex 4:	4.3 5.1; 5.2
7.	Other aspects of duties:	Routine work due to high degree of automatization, nevertheless, a feeling of having a medium-level of autonomy
8.	Required competences in accordance with Annex 5:	1.2; 1.3 3 6
9.	Vocational training qualifications:	Steel construction fitter
10.	Entry qualifications/Professional experience:	See vocational training qualifications; also employed as a janitor
11.	Vocational training related to the environment:	6-week training course to become a boiler operative

CEDEFOP - European Centre for the Development of Vocational Training

Occupational structures and profiles in the Federal Republic of Germany in the field of environmental protection in the public service sector with reference to air pollution control
Christoph Nitschke, Kirk Fünderich
Institut für ökologische Wirtschaftsforschung GmbH, Berlin

CEDEFOP panorama

Berlin: CEDEFOP - European Centre for the
Development of Vocational Training, 1994

1994 - 194 pp. - 21,0 x 29,7 cm

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As part of comparative research into qualifications in the area of environmental protection studies were drawn up of occupational profiles in public service in a number of Member States (limited to the wide area of air pollution control). The studies on the United Kingdom, Germany and Italy have already been published in the "CEDEFOP Document" series. The English translation of the German report now appears in the new series called

CEDEFOP panorama

In this project the qualification structures and the main occupational profiles and their areas of application were examined on the basis of empirical surveys for four main operational areas of public service: "Political decision-making", "Research and Consultancy", "Supervision and Control" and "Information and Publicity". On account of the increasing number of standard provisions in environmental protection at both national and Community level there is a noticeable quantitative and qualitative increase in the demands placed upon the occupations and in the competences required.

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National report